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X-RAY, RADIUM**

(Incorporating PHYSICAL THERAPEUTICS)

with

INTERNATIONAL ABSTRACT

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Volume XVIII

JULY, 1937

No. 7

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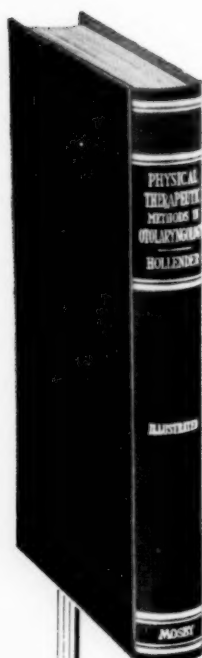
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PHYSICAL THERAPY OF PERIPHERAL VASCULAR DISEASE *

BEVERLY CHEW SMITH, M.D.

Assistant Visiting Surgeon, Presbyterian Hospital

NEW YORK

Properly selected and adequately supervised physical treatments have become necessary additions to the present day management of peripheral vascular disease. This in a large measure is due to the fact that neither medicine nor surgery alone has proved entirely adequate for these conditions. Acute and chronic obliterative and spastic peripheral arterial disease, so-called trophic changes in pathologic extremities, varicose ulcerations, contractures, and abnormalities following trauma and edema associated with impeded lymph return, are the most frequent types of cases in which physical therapy is indicated. The object of this communication is to present the manner in which such treatments contribute to the clinical relief of patients suffering from peripheral vascular disease.

For this type of service a physical therapy department properly supervised by a physician and adequately manned by trained technicians has been created as a separate entity in hospitals. Cooperation has been established between this department and the surgical services that provide for the special types, duration and observation of the effects of treatments, and the keeping of adequate records by both departments as to the efficacy of therapy.

Operative Method of Peripheral Vascular Clinic

The peripheral vascular clinic was organized at the Presbyterian Hospital in 1932. It soon became so large that it could only care for patients referred from other departments and those selected for treatment by the chief of the clinic. The facilities for hospitalizing this group of patients had of necessity to be limited because their hospital stay was prolonged. Most of these patients are in or beyond the sixth decade of life, are to a large extent indigent, so that once responsibility for their care is assumed, it will have to be continued in some form until their demise. These facts render self-evident the necessity for special hospitals for the treatment of this type of patients, yet I do not know of the existence of such institutions.

Only such patients are admitted from Vanderbilt Clinic to the Presbyterian Hospital who require surgical intervention, or more extensive tests and therapeutic observations than can be made on ambulatory patients. A complete history is taken, physical examination and appropriate laboratory tests are made in a surgical diagnostic clinic to which patients are referred from the Peripheral Vascular Clinic. Upon their completion the patients are referred back for more specialized tests related to the extremities. After evaluation of the collected data, treatments are decided upon and the patients are referred to the cardiology or other departments of the clinic for determination of the amount of a particular type of therapy their vascular system or complications would safely tolerate. With such a recorded clinical work-up the patients may be referred to the physical therapy department with a request for the application of a specific agency of known intensity and duration. If the chief of the physical therapy department should feel that an-

* Read at the Fifteenth Annual Session of the American Congress of Physical Therapy, New York City, September 8, 1936.

other form of management is indicated, he makes the change only after consultation with the surgeon referring the patient. A record of the kind and duration of treatment, and by whom given, is noted on the chart with a record of the following frequent visits to the vascular clinic, where repeated special examinations are made to determine their effect and the progress of the disease.

A surgically supervised podiatric clinic in charge of a graduate podiatrist, is an integral part of the peripheral vascular clinic. A written sheet of instructions is given to each patient with organic foot defects for the hygienic care of the extremities, corrective exercises and appropriate foot wear. Diabetic patients are cared for in the metabolism clinic, but are periodically referred to the vascular clinic for a check of the state of the circulation in the extremities. The social service and visiting nurse departments cooperate in the home and convalescent care of both hospital and clinic patients. They have been most useful in arranging for the acquisition of and instruction in the use of artificial legs of those patients requiring amputation. Thus one sees how heavily the vascular clinic draws upon consultations before referring patients for any type of treatment, and the responsibility the physical therapy department assumes in the use of physical agents which must be adapted to a diminished blood supply. It hardly needs stressing that these can do irremediable harm more easily than when applied to normal arteries, skin and other component tissues.

The largest group of peripheral vascular disease cases under our present care suffer from arteriosclerosis without diabetes. Those with diabetes and arteriosclerosis are next, and in turn are followed by a group suffering from thrombo-angiitis. Raynaud's disease, arteritis of unknown etiology, and spastic arterial disease cases which defy classification according to the accepted nomenclature, are usually also accompanied by symptoms of sympathetic nervous imbalance.

The patients of the arteriosclerotic group, most of whom are in the sixth to eighth decades of life, have been particularly helped by physical therapy. I have been impressed with the fact that no one special treatment seems to benefit these patients as much as the multiple ones they have received. Pressure-suction, massage, warm whirlpool baths, elevation and depression exercises, bed rest, small intravenous doses of 5 per cent saline solution, proper foot wear, and protection against cold and trauma, each proved important.

Selection of Pressure-Suction Boot

For the past three years we have used the pressure-suction boot and the impression gained is that it is physiologically sound and that mechanical improvements of the cuff about the thigh have increased its efficacy. The type of case, the duration of each negative and positive cycle, the amount of each pressure, the total duration of the daily treatment under close supervision are factors of prime importance. Pressure-suction is certainly not devoid of possible harm. Lymphangitis, lymphadenitis, cellulitis, phlebitis, or moist gangrene contraindicate its use. The presence of a dry gangrenous digit without clinical evidence of absorption from the line of demarcation does not contraindicate pressure-suction, but necessitates adjustment and periodical change to conform to the clinical course. Hospitalization yields a maximum of good through the facility for the administration of two to four daily applications of one to two hours each. In cases with a normal skin, pressure-suction is preceded by massage of the extremity for 15 minutes and followed by a whirlpool bath at 100 to 103 degrees F. for 15 to 20

minutes. The patient is returned to a warm bed with his extremities covered by blankets to conserve external heat, or this is secured by a thermostatically controlled light under a cradle covered with three blankets reaching to the inguinal regions. This light automatically is switched on when the temperature of the air under the cradle reaches 90 degrees F. and is turned off when it reaches 95 degrees F.

Elderly, debilitated patients with cerebral, vascular and cardiorenal disease cannot stand as intense treatments as those less afflicted. All such treatments should be given according to their possible effects on the vasomotor system as well as local lesions. An intravenous injection of foreign protein given with fifty million typhoid organisms has been known to produce a chill during which a cerebral hemorrhage occurred and the patient died. Severe coronary thrombosis without fatality has been observed during intravenous administration of small doses (50-100 cc.) of hypertonic (5 per cent) saline solution. Thus agents other than physical have their attendant dangers. I have seen pressure-suction boot treatments cause excoriations of the thigh, which in one case produced a large slough. I have seen it cause bleeding in drained wounds of the foot and at the sites of amputated digits. To my knowledge it has caused skin ulceration on the side of a leg with acute thrombosis, necessitating a higher amputation than would otherwise have been required. Quiescent, slowly subsiding ulceration in a case of thrombo-angiitis resulted in a cellulitis, requiring amputation of several toes, which healed slowly. All wounds in an extremity should be cultured before using pressure-suction. If a hemolytic streptococcus, staphylococcus aureus, or colon bacillus is present in the wound it should be surgically treated until granulations have appeared before pressure-suction treatment is instituted. The treatment should be started with very small pressures for short periods, and stopped on increase of pain or spread of cellulitis.

I am firmly opposed to the use of machines to which patients have to be adapted. This is a dangerous principle. A pressure-suction apparatus which cannot be adjusted to the patient's tolerance, should be rejected. We employ boots in which the duration of the positive and negative cycles can be changed from ten to sixty seconds. This varies the number of cycles of pressure per minute. Besides this cycle change the pressure of each positive or negative phase can be regulated from zero to 120 mm. of mercury. Cycles for individual patients need changing during a treatment. If improvement takes place, they can usually stand higher pressures for a longer time. An extremity should show a pink to red blush, an alternate filling and emptying of the superficial veins, and either a cessation or a definite decrease of pain to indicate beneficial effects. If these changes are not evident, there is a real danger in the administration of intense dosage. Increased ischemia with skin necrosis or actual additional thrombosis of the larger and smaller superficial arteries may occur.

In advanced cases minimal pressures and cycles consistent with comfort should be begun with and gradually increased until either improvement warrants continuation or aggravation of the impaired circulation indicates some other types of therapy. Harm has resulted from overtreatment with an apparatus not sufficiently flexible to deliver the dosage the patient will tolerate. Persistence of pain is an indication to change the intensity of or stop the treatment entirely. For the above reasons any pressure-suction machine in a hospital or office should be supervised by a physician who is willing to spend the needed time with the patient during his first treatment and quite frequently at short intervals during the subsequent applications to adjust the pressure and cycles to physiologic responses. True, a larger percentage of

patients will tolerate stereotyped treatment, but the minority who cannot may be irreparably damaged.

The use of multiple outlets up to four boots from a single pump is of questionable value, as all patients do not have the same degree of circulatory impairment, so that pressure and cycles which may be the optimum for one may not be so for another. As a matter of fact, different pressures and cycles may be indicated even for the two legs of one and the same patient. It should be borne in mind that the same pressures and cycles are delivered to each boot connected to one pump. While more patients can be treated in a given time at a lowered financial outlay, cases should be selected for simultaneous treatments only if their responses are nearly equal to the set up of all boots.

Effects of Pressure-Suction

Open granulating wounds without residual exudate will, if subjected to proper pressures and cycles, heal more rapidly. Serum sometimes exudes from the granulations without bleeding, and if appropriate surgical dressings to prevent scab formation and retention of pus are applied between treatments, pressure-suction therapy will prove beneficial.

Several years ago I measured the surface temperature of the extremities of ten patients with advanced peripheral arteriosclerosis after diathermic treatments at 100 milliamperes, for 20 minutes and also after 20 minutes of a whirlpool bath at 103 degrees F. Following the diathermy treatments the temperature of the toes returned to pre-treatment levels in 15 to 20 minutes, while with the whirlpool baths the temperature of the toes remained elevated one to four degrees for one to two hours. This latter treatment in conjunction with massage keeps the skin soft and free of minute excoriations which are portals of infection. Callosities are softened, yield more readily to appropriate treatment, fungous infection is lessened, patients become conscious of foot cleanliness and last but not least, the treatment is more economic. For these reasons whirlpool baths have replaced diathermy in our clinic in the care of peripheral vascular diseases. If patients can withstand transportation these treatments are given in the physical therapy department, otherwise a portable apparatus is used at the bedside.

These baths in conjunction with massage, given three to four times weekly, have afforded better symptomatic relief in thrombo-angiitis than the pressure-suction boot in the small group of cases in which they were used. Pressure-suction therapy will have to be tried more extensively before it can be evaluated for thrombo-angiitis obliterans. It has caused pain at minimal doses, has not relieved pain at maximal doses, has not decreased intermittent claudication, has exacerbated local infections and ulcerations with less color and venous changes, and has caused or aggravated phlebitis, and ultimately has saved fewer extremities with thrombo-angiitis than was attained in the arteriosclerotic group. There have been some patients who have been symptomatically improved with properly adjusted cycles and pressures, but these adjustments have to be frequently checked and changed.

Physicians who are not familiar with the use of the oscillometer and surface temperature appliances should be able to interpret the clinical readings made for them by others, as they afford a definite index to the amount of treatment tissues will tolerate. For clinical work, a room with a temperature of 70 degrees F. without circulating air will suffice to take surface temperatures, but for experimental study a constant temperature and humidity room is a necessity.

Physical therapy has not yet practically and continuously benefited patients with vaso-spastic disease sufficiently to warrant its routine use. In

Raynaud's disease when scleroderma and advanced connective tissue changes have occurred, digital massage and whirlpool baths to the arms, if tolerated, have aided the healing of ulcerations. Neither the underlying pathologic nor the local condition has been benefited enough to justify other than symptomatic evaluation of this type of therapy.

In the past four years 275 new patients, all in an advanced stage, totalled 3,380 visits to the clinic limited to peripheral vascular diseases. Most of their treatments have been carried out in the physical therapy department to which they have paid many more visits than to the vascular clinic. Of these 275 cases, only two who came to the clinic without gangrene have developed this condition and required amputation. These two cases verged upon gangrene on admission and the short period of treatment they received before frank gangrene developed, was inadequate to check the process. Both were cases of thrombo-angiitis obliterans. The others are either improved or happier in their arrested clinical state. These facts manifest the aid physical therapy has rendered patients with peripheral vascular diseases when scientifically administered in association with other standard therapeutic measures.*

20 East 53rd Street.

* Discussions of the above and related papers will be published in an early issue.

Bones Continue to Change After Adulthood Is Reached

That bone formation is an ever-changing process in the body and not a happening occurring only during youth is suggested by experiments just reported by two Danish scientists.

Using phosphorus made artificially radioactive so that its atoms could be "traced," Prof. George Von Hevesy of the Institute of Theoretical Physics and Dr. O. Chiewitz of the Finsen Hospital, Copenhagen, have studied the absorption of phosphorus atoms in bone formation.

Using experimental rats, the scientists found that the phosphorus atoms fed in the food take about two months before they come out of the body. They report:

"The experiments suggest strongly that the formation of bones is a dynamic process continually taking up phosphorus atoms which wholly or partly replace others."

It was found that 30 per cent of the phosphorus atoms deposited in the skeleton of an adult rat were removed in the course of twenty days, and that the front teeth absorbed ten times as much phosphorus

as the average for the whole skeleton. The molar teeth, by contrast, absorbed less than the average.

The technique employed in the experiments was to add radioactive phosphorus to one milligram of ordinary inactive phosphorus to such an extent that the Geiger counter, used in detecting the radioactive element, registered 1,000 clicks a minute.

Thus, if any product obtained later by subsequent biological or chemical reactions gave only one click a minute, the scientists knew only one thousandth of a milligram of the inactive phosphorus was present.

The ability of radioactive phosphorus atoms to act as tracers through the animal body is comparable with research on heavy water whose "heavy" isotopic atoms can similarly be used for tracing biological happenings.

Last January Prof. Hevesy reported that after a person drinks a glass of water nearly one-half of it is still in the body after nine days. He used the heavy hydrogen atoms in heavy water to detect the process of elimination. His present report on phosphorus absorption is similar research with a different chemical element. — *Science News Letter*.

CLINICAL ASPECTS OF SHORT WAVE DIATHERMY *

DISRAELI KOBAK, M.D.

CHICAGO

The biologic properties of short wave diathermy have been enunciated more than a decade ago, yet considerable confusion still prevails about its physical characteristics and therapeutic merits. This is partly evidenced by a chaotic terminology and fantastic claims for curative powers. Out of a multiplicity of terms two are in prominent competition — ultrashort wave therapy and short wave diathermy. These designations do not appropriately express the nature of this therapeutic agency. It should be recalled that the energy utilized is virtually identical with that of short wave radio and television transmission. The oscillations of this current range ten to one hundred times higher than those of conventional diathermy, or, what amounts to the same thing, the wavelengths are correspondingly shorter.

It is not my intention to recapitulate known facts regarding the relation of short and ultrashort waves to the electromagnetic spectrum, but to restrict myself to the briefest possible discussion of certain important data related to clinical medicine. In science imagination should be held within the bounds of observed facts. In visualizing the term short wave diathermy it should be appreciated that the concerned energy does not possess the physical and biologic characteristics of both short wave radio transmission and of conventional diathermy, which shows the inaccuracy of the designation. It is known that certain groups of radiation in the spectrum always react in a different manner. Adjacent regions do not tend to combine forces into a new harmony, but emit their respective energies in a dual manner. Thus to illustrate, one cannot blend infra-red with visible light nor ultra-violet with x-rays as new components of energy. This same holds equally true for the energies associated with conventional and with short wave diathermy. It is therefore not surprising that the term short wave diathermy has met with objections abroad by many pioneers in this field of endeavor. Thus Fritsch and Shubart¹ assert that "it is not correct to consider short wave therapy to be an improved form of diathermy. The biologic and therapeutic effects of short wave therapy are of a completely different character, hence it must be inferred that a second characteristic specific action must be occurring in addition to its thermal action."

This dual action has been generally pointed out to possess an electric depth effect that permits the force of the electric field to pass through living structures, with a thermal depth reaction being created by the absorption of the energy and influenced by the cooling action of the circulating blood and the conductivity of the tissues.

The differences between the physical characteristics of short wave electric fields and the longer waves of conventional diathermy are so readily distinguishable as to place them into separate categories. The term short wave diathermy therefore gives rise to the question whether it is possible actually to interweave or blend two such distinct fields of electric energy into a new physical concept. The facts point against such a possibility, and demonstrate their special spheres and contrasting action. It would therefore have been logical to differentiate this special range of energy from its

* Read at the meeting of the Mid-Western and Southern Sections of the American Congress of Physical Therapy, St. Louis, Missouri, March 9, 1937.

respective boundaries by a term which recognizes both its proximity to infrared radiation and its deep thermic manifestation, namely, *radiathermy* (ra-dia-thermy). But since popular usage has lent authority to the terms here critically reviewed, they are at present interchangeably used to denote a new contribution to thermotherapy, superior to conventional diathermy.

Physical Characteristics

For clinical purposes two forms of short wave generation are utilized. They consist of electric oscillating systems capable of either statically accumulating electric energy in the form of a capacitance, or by magnetically inducing eddy currents described as an electromagnetic field. Depending on whether the circuit has a large capacity or a large inductance, damped or undamped waves may be emitted. The first is generated by a series of spark-gaps, the second by electronic or so-called radio transmission tubes, both releasing a stream of electrons in a series of high frequency oscillations ranging from 10 to 100 million per second, or linearly from 30 to 3 meters. The secondary circuit of such an oscillatory system provides two principal means of transferring these radiations to the patient. One is by conducting cables connected with either condenser pads or air-spaced electrodes which are loosely coupled to the treated part, the other is by means of a special induction coil placed around or over the concerned region. This region is flooded by a series of ultrahigh frequency electronic impulses through generated electrostatic and electromagnetic fields. The internal structures are subjected to certain influences, such as electronic stresses, described as displacement phenomena, and to a polarizing or magnetic strain on the very molecular particles in the field. The therapeutic effects vary with the intensity of the field, the wavelength and the technic.

The heat generated in the tissues subjected to this electric field force varies according to the degree of their permeability and heat capacity. Since the body is made up of minutely different concentrations, namely, water, electrolytes and the like, their insulating characteristic spoken of as a dielectric constant plays a great role in the heat distribution. In short wave treatment one encounters diverse groups of insulations designated as loss-free and loss-producing dielectrics. The loss-free, such as air, glass or clothing do not become heated, while the loss-producing dielectrics, such as the solid structure of living tissue with its watery content, electrolytes, colloids and external perspiration are all thermogenic, owing to their tendency to transform electric energy into heat. A definite and important relationship is expressed in the term "dielectric constant," for this physical concept represents a unit value for air under normal pressure and temperature as compared to water or the body fluids, the proportion being 1 to 80. It follows that living tissues transmit the lines of force 80 times better than air and hence are highly receptive to short wave currents.

Factors Influencing Thermic Depth Effect

Determination of heat distribution by various wavelengths and of their optimal values in living material has been the earliest objective of study since Schereschewsky's discovery of their biologic action. Priority for establishing the relationship between heating of an electrolyte and wavelength goes to Christie and Loomis.² Their observation was later extended and interpreted from its medical aspect by Pätzold.³ When several dielectrics of different concentrations were simultaneously penetrated by field forces of various wavelengths, it was shown that the actual as well as the relative temperature of the individual electrolytes was altered, with the optimum heating effect being determined by wavelength. This does not imply as

some have vaguely inferred, that one can demonstrate specific heating of living material, but should be interpreted in the sense that the very smallest constituents of the treated parts are selectively influenced. This is shown in the higher temperature concentration of red blood corpuscles as compared to that of the blood serum, or in the overheating or death of parameria or small fish as contrasted with the lower temperature of the water. This feature of our problem is of critical significance, requiring additional correlation for therapeutic purposes. It conveys important implications difficult of proof by *in vivo* experimentation, denial of whose value, however, means to ignore the interpretations of many classic laboratory tests pertaining to abnormal changes in the body.

For the determination of depth heating several methods have been employed with many erroneous interpretations. One of these is the inferential method associated with the relative sensation of heat experienced by the individual; another is the objective demonstration of the changing temperature in phantom models or dead material. Both are unsatisfactory and bear little if any relationship to actual conditions in the living. Many apparatus are sold today on the basis of similar fallacious tests. Superficial sensation of heat is experienced even with inadequate apparatus. Indeed, the more superficial their penetration, the greater the surface concentration, and the more ineffective the deep heat action. So far as the value of experiments on phantom models of meat, bread or agar are concerned, they offer merely a relative orientation of deep heating possibilities of various short wavelengths by different techniques. The heat gradient, however, is different in living tissues, because the circulating fluids and the sensory nerves prevent local heat concentrations — defensive mechanisms obviously absent in experimental models or phantoms.

Nevertheless it has been possible to demonstrate that deeper heating is attained with wavelengths of about 6 than with those above 15 meters. This is seen when the tissues are spaced in a condenser field of high wattage output and checked by thermocouples for temperature changes. Production of depth effect is physically dependent (1) upon the electrodes being as large as the affected area, and (2) spaced to an extent that the high field density near the electrodes lies outside the treated part in order to avoid surface heating and to produce a central homogeneous field. The depth effect therefore depends on two factors — electrode distance and wavelength.

Holzer and Weissenberg⁴ assert:

The possibility of developing heat in completely inaccessible parts is undoubtedly a unique quality of short waves. The possibility of thermally influencing the interior of the smaller life particle — the cell, that is a point in an organism having definite electrical properties and morphological structure — obviously suggests that we may expect to find in this manner some complex expression of life activity at the points under treatment which cannot be achieved by any other means.

It is, however, clinically impossible with the present construction of apparatus actually to determine the exact heating of tissues. The meter in the circuit is a useless guide for this purpose, serving more as a criterion for the tuning of resonance, so that one is compelled to depend on the sensory impression of the patient. This is perhaps the weakest feature of the modern short wave transmission circuit, hence it requires constant supervision to prevent dangerous overheating.

In electrostatic and magnetic fields, short wave emission undoubtedly possesses some special character associated with an internal heat concentration or point energy transformation. When we attempt to explain this action on the basis of heat or of energy distribution we enter the realm of

metaphysical speculation, for one cannot prove whether heat is the cause or the by-product of the energy absorbed by the treated part. Experimental evidence has shown that physiologic and clinical reactions are obtained with both thermic and athermic sensations. It has yet to be established that curative results are solely to be ascribed to the heat proper created in the tissues. Science today admits such a relationship, but questions whether it is one of cause and effect. In support of this view Liebesny⁵ has recently called attention to the favorable therapeutic and biologic effects of athermic ultrashort waves in inflammatory and suppurative processes. (Compared with short wave diathermy, one utilizes here a low energy input of .1 to 10⁶ watt seconds per cubic cm. as compared to that of 50 to 1 watt seconds per cubic cm.) This therapeutic possibility opens a new field of investigation. It also emphasizes that the reported burns and dangers from overheating is a real problem to which I shall revert later.

Technic

The manner in which a region is subjected to short wave treatment plays an important role in the nature of the therapeutic results. Technically about as simple as a minor surgical incision, it nevertheless presupposes a corresponding orientation and precision without the risk and responsibility of the former. It is only by carelessness or ignorance that negative or untoward results may take place. As has been shown elsewhere,⁶ proper technic demands that the patient lie at ease in a comfortable position, the treated part freed of any metallic substances in the field. While the patient's clothing may be retained, it should be removed for comfort and protection against possible burns produced by perspiration. Suitable electrodes for special treatments are then adapted, spaced and retained over the treated region. The patient is advised that the treatment should produce only pleasant warmth and that any painful sensations should be at once reported to permit adjustment of the circuit. These precautions must be observed because strong dosage may produce superficial or deep heat concentrations, resulting in burns or an increase of painful sensations. Intensive heating tends to increase the permeability of the tissues and to produce a temporary paresis of the blood vessels, creating in turn an undesirably prolonged congestive hyperemia. Improper technics may therefore result in more or less serious dangers to the patient.

Deeply situated organs are thermically reached best by apparatus of strong wattage and of wavelengths below ten meters, the current being carried to the body by air-spaced condenser electrodes. It is precisely by such a technic characterized by skin-electrode distance that one can attain required depth effect with a minimum of surface heating. Contrary to general belief depth heating cannot be attained by parallel flexible condenser electrodes closely connected to the patient unless one uses properly spaced cuff electrodes, nor can one successfully obtain an air-spaced depth effect with wavelengths above 12 meters. To sum up, optimum depth effect is secured when cognizance is taken of (1) the thickness of the treated part, (2) the output and wavelength of the apparatus, (3) the size of the electrodes, (4) the distance of electrodes from the skin, and (5) the character of the intermediate layers, such as clothing, felt, and the like (Fritsch and Schubart).

Clinical Limitations

Stressing of the clinical limitations of short wave diathermy is made necessary by the circumstance that since its advent uncritical enthusiasts have attributed to it biologic properties capable of overcoming virtually

every known pathologic process. Indeed, there is hardly an injury, neoplasm or internal disease for which this agency has not been acclaimed a panacea. Such a concept can only bring about a reaction detrimental to this otherwise very valuable addition to physical therapy. As we begin to understand the physical and biologic effects of the diverse wavelengths thus far studied, we discard all fantastic concepts of occult properties and reduce both the known physics and physiology of short wave diathermy to simple formulae, albeit all phases of this problem have not yet been clarified.

We need only draw a comparison with the better and more widely known properties of conventional diathermy to arrive at a true estimate of the superiority but also of the limitations of short wave therapy. While in diathermy we have a thermotherapeutic agent superior to any caloric energy conveyed to the body from without by any of the usual appliances, its depth effect created within the body is, however, less pronounced than is commonly believed. The depth effect of short wave diathermy on the other hand is virtually unlimited by proper technic, so that all viscera can be heated or influenced with comparative ease. A characteristic of the short waves that merits especial consideration is its property to penetrate dense structures so that the entire osseous system can be subjected to this form of therapy.

We need only allude to the pain relieving properties of heat and to its influence on inflammation to indicate part of its scope. While the whole problem of the effect of heat on both inflammatory and suppurative processes is still a matter of theoretic dispute, clinical experience has definitely demonstrated the value of short wave diathermy in the acute and subacute types of inflammation, irrespective whether or not they are associated with suppuration. Here, then, we have a specific and very important indication for short wave diathermy, in contrast to conventional diathermy which is generally conceded to be contraindicated in acute infections. Since this statement is opposed to the general concept that any form of heat produces hyperemia and thereby has a favorable effect on inflammatory and suppurative processes in any stage, it is necessary to point out that the heating effects of the short waves are both regionally and structurally at variance from those of all other themogenic agencies, not excepting conventional diathermy.

Experimental evidence reveals that the short waves do not obey Ohm's law in the sense that the tissues do not present the same resistance to them as to other electric currents. Thus the intensive heating of fat and fascia seen in diathermy is minimized in short wave diathermy, which brings about a more even distribution of heat throughout a treated region. Clinically, however, the most important effect is manifested in pathologic structures, because they retain the heat much longer than the tissues in the normal environment that are subject to the cooling effect of the circulation. Of great interest is the fact that in short wave therapy we obtain effects other than heat and the resulting hyperemia. Audiat⁷ has demonstrated that high frequency currents have a distinct effect on nerve tissue, an observation which lately has been confirmed by Pflomm⁸ with particular reference to the sympathetic nervous system.

Proof that the therapeutic effect of short waves is not to be ascribed solely to heat and vasodilatation is supplied by the satisfactory results observed in inflammatory and suppurative processes also from currents of low wattage but of very short wavelengths, the heating effect of which virtually was absent. It is evident that the effectiveness of short wave therapy is due to a combination of factors, such as increase of hydrogen ion concen-

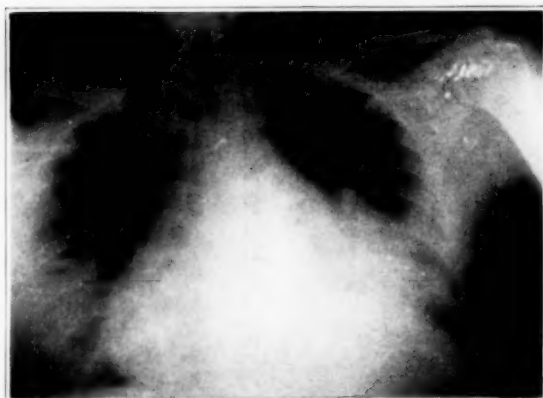


Fig. 1.—*A*, Adhesive pericarditis with pericardial and pleural effusion. Marked enlargement of cardiac shadow toward both sides. The roentgenograms *A-C* are those of Case No. 2.



Fig. 1.—*B*, Reduction in size of shadow following early improvement of symptoms.



Fig. 1.—*C*, Heart slightly enlarged toward left but with no evidence of pericarditis.

tration, phagocytosis, resorption of effete metabolic products and stimulation of reticulo-endothelial cells.

It is not my intention to submit a detailed list of diseases and abnormal processes in which short wave diathermy has proved of benefit, since the cardinal biologic effects suggest the indications for this form of therapy. Generally, they may be grouped as inflammatory, suppurative, and degenerative processes to which should be added the manifold algias, disturbances characterized by pain as the principal symptom not traceable to a specifically surgical or mechanical cause. An appreciation of the indications and of the effectiveness of short wave therapy will perhaps be best afforded by actual clinical cases, of which a few are submitted for illustration.

Case Reports

CASE I.—N. H., a Frenchman, aged 54, presented an extensive indurated swelling over the right brow with a livid edema surrounding the orbit. The patient suffered from excruciating pain and complained of a tension which he described as "keeping the right side of his face and forehead in a vise." Even a cursory physical examination produced a desire to intervene surgically as there was evidence of deep supuration. The patient was somewhat informed and himself requested a treat-

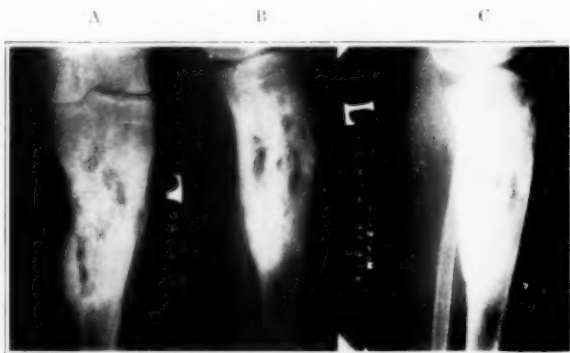


Fig. 2. — A-C, Roentgenograms of changes produced by short wave treatment in chronic osteomyelitis of left tibia, showing four discharging sinuses and calcification of muscles. Treatment with a 6 m. electromagnetic coil produced complete disappearance of calcified area and clinical improvement.

ment with short wave therapy. The first treatment was given with an air-spaced condenser electrode from a 6-meter apparatus for 15 minutes at an extremely low dosage, that is, with the patient barely experiencing a sense of warmth. The following day the patient reported himself as greatly relieved from pain. Examination showed that there had taken place a spontaneous rupture from which pus in considerable quantity was evacuated. The patient was discharged cured after 5 additional treatments.

Comment: This case diagnosed as a furuncle complicated by cellulitis ran a course seldom encountered under any other form of therapy. The rapidity of relief has been a gratifying experience, to which should be added that restitution took place without any scar deformity.

CASE 2. — A man, aged 31, was hospitalized with a diagnosis of adhesive pericarditis and pleural effusion following lobar pneumonia. This patient was gravely ill with a none too favorable prognosis. After a staff consultation he was subjected to short wave therapy. Four treatments with a 12-meter wavelength, each lasting 20 minutes at a mild dose of heating proved adequate to afford him great relief from his pain and orthopnea. After 19 treatments the patient was discharged as greatly improved to a convalescent home.

Comment: The correctness of the diagnosis and of the objective improvement was evidenced in this case by a series of x-ray examinations made on admission and shortly before discharge. The first roentgenogram showed the cardiac shadow to be greatly enlarged toward both sides with a denser shadow to the left of the middle line, the roentgenologic diagnosis adding pericardial effusion to that established by the clinical findings. The last roentgenogram shows the heart slightly enlarged towards the left, but without any evidence of pericarditis. Considering the gravity of this case the improvement obtained from the treatments within a period of 24 days is certainly a severe test for the therapeutic value of short waves.

CASE 3. — A boy, aged 15, was admitted August 17, 1936, with a diagnosis of chronic osteomyelitis of the left tibia, with calcification of the muscles in the infected area shown on x-ray films. The muscles of the left leg were atrophied with four fistulas discharging pus. Treatment was given with a 6-meter wave in the form of an electromagnetic coil around the affected region. After 20 treatments, radiologic examination revealed complete disappearance of the calcified area and two large sequestrs. These were removed surgically with comparative ease.

Comment: Osteomyelitis is the *bête noire* of the medical profession. When one considers the doubtful effectiveness of repeated excochleations and medication, the result obtained in this case, which is one of many similar ones in our experience, clearly indicates that surgeons should advise short wave therapy before operative intervention. Often it will be found that, as in this case, sequestrs are so separated after a series of treatments as to render their removal a minor procedure. It goes without saying that

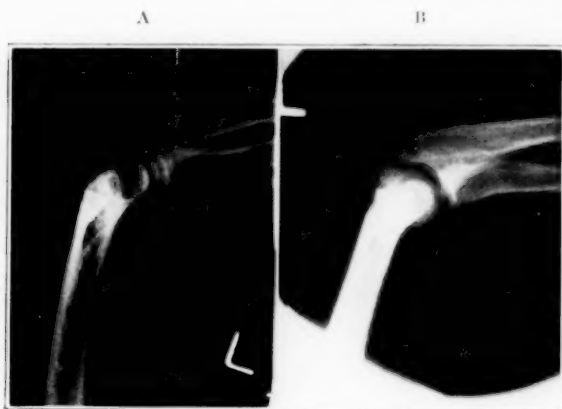


Fig. 3.—Fracture of left elbow with marked contracture and calcification of tissues over the fracture, (A). After a series of short wave treatments, calcification was reduced and function improved, (B).

in this as in other similar infections, short wave diathermy is not to be regarded as a specific, but as an adjuvant for the purpose of enhancing the efficiency of recognized therapeutic measures.

CASE 4. — A boy, aged 15, was admitted in the summer of 1936 with a history of fracture of the left elbow with calcification of tissues over the fracture, marked contracture and limitation of motion, the diagnosis being established both roentgenologically and objectively. Of particular interest is the circumstance that for two months previous to hospitalization this patient had been given local diathermy three times weekly combined with passive and active exercise without the least benefit. Short wave therapy applied transversely to the left elbow gave marked improvement, the patient being able to flex and extend his arm to a range of 160 degrees.

Comment: Fractures in the vicinity of articulations being very common and difficult to manage, this case clearly shows that the older methods of physical therapy are not always adequate. The superiority of short wave over conventional diathermy is here strikingly demonstrated not only by the clearly discernible functional restoration, but also by organic changes observed by x-ray checks. Originally the x-ray examination showed marked callus formation at the radial aspect of the humerus, with an area of calcification above the olecranon tip posterior to the humerus. The last film showed cubitus valgus position due to the old fracture, with the calcification at the olecranon fossa virtually disappeared.

Conclusions

Short wave diathermy of wavelengths from 30 to 6 meters is a type of high frequency current differing from long wave diathermy in the character of thermogenic properties and biologic effects.

The designations short wave diathermy and short wave therapy are improper both etymologically and biophysically, because they do not convey the true character nor the action of the short waves. The term radiathermy is appropriate because of its inclusiveness and simplicity.

Short waves possess the electrical property of overcoming the resistance offered to other currents by tissues of great density, and are therefore indicated in the treatment of the articulations and bones affected with inflammation or suppuration. This characteristic also indicates the value of this type of current in similar affections of deeply situated viscera, based upon adherence to a rigid technic.

In spite of the therapeutic superiority of short wave over conventional diathermy, its field is limited to the management of inflammatory, suppurative and degenerative processes and to the alleviation of algias. But even

in this restricted field short waves are neither a panacea nor a specific, but merely a valuable adjuvant to classic therapy.

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Discussion

Dr. J. S. Coulter (Chicago): I have been most interested in Dr. Kobak's excellent paper. In the light of available critical evidence, I submit what the Council on Physical Therapy of the American Medical Association has accepted in regard to short wave diathermy. Within the range of 6 to 25 meters investigated there are no specific biologic or bactericidal effects. The therapeutic effects are due to the heat produced within the tissues. There are no significant differences in the heating of the various wavelengths investigated that cannot be explained on the differences in the technique of application.

Dr. F. H. Ewerhardt (St. Louis): This rather highly technical paper is very interesting although I cannot quite agree with what Dr. Kobak has said in its entirety. Dr. Kobak believes in the biologic effect of the short wave. He probably represents a small group of men who are following the concept first brought out in Germany. I am not in position to contradict Dr. Kobak because I have not been able to duplicate some of the work which he has shown on the slides.

I have come to the conclusion that it takes a great deal more clinical evidence than has thus far been brought forth before we can definitely state that there are actually biologic effects.

I want to emphasize some of the things that Dr. Kobak said with respect to the danger of deep-seated burns. As a matter of fact I think that we committed grave errors in days gone by in the use of conventional diathermy, because we had no definite way of measuring the heat we administered. We still know so little about short wave diathermy that I am almost afraid to apply it, although I have used it a great deal. I am a little bit afraid because I cannot help but feel that possibly if I am not very careful I may create an injury. This is because the

patient of the past has been used to giving his own subjective interpretation of the effect of heat. I recently treated a patient with a painful shoulder with adhesions, and I congratulated myself because the second day he felt much better. I tried a different technique the second and the third time after which he complained of a soreness in the deltoid muscle. I am convinced that in that instance I gave the patient more heat than was good for the muscle tissue. This is what I mean when I say that I am a little bit afraid of the short wave.

There is a difference between the conventional diathermy wave and the so-called short wave. The theory which we have subscribed to has been that the tissue has met with resistance and that the electric energy has been transformed into heat energy. That is an accepted theory about diathermy. We are also holding now that besides this particular feature there is still another which causes a secondary heat effect that is present in short wave but not in conventional diathermy. So I find myself a little bit confused as to really what I should say when it comes to selective heating. I believe that the secondary effect which I just mentioned is present, but I am not willing to accept the theory that we have a control over that situation. Therefore, I doubt very much whether we can subject any given organ to the process of selective heating.

I cannot help but feel admiration for the position Dr. Kobak has taken. He is one of the few men in the United States who takes that progressive thought, and who knows — he may be right. He has done considerable research, enough to cause one to ponder and to feel that perhaps in time we will know more about this complex problem.

Dr. Disraeli Kobak (closing): I want to thank the discussers for their very

frank statement of faith. What they have said so far has been nothing more than based upon faith. If they had followed the work of outstanding scientists both in the physical and also in the biological and the clinical fields, they would perhaps agree rather than differ with me. So far as the biologic characteristics of short wave as compared to diathermy are concerned, it is already a closed history. There is no need for me to repeat obvious facts that have been transferred to the history of medicine as far back as 1891 by the greatest of electrophysiologists — d'Arsonval. So far as clinical characteristics are concerned there is no division of opinion among European students. Publication in the Archives of an article by Fiandaca, of Italy, and his demonstration of the curative value of short wave radiation in pulmonary lesions, certainly should dispel all doubt.

Nevertheless the disagreement current among American workers is a very healthy sign, because in science we should at least begin with skepticism, not with a profession of faith. We have this at the moment — the literature of the world on this subject.

I have in mind a prominent surgeon who was a patient of mine, and, like Dr. Ewerhardt I also had my doubts when he came in the first time with acute excruciating pain in his right shoulder, with limitation of motion. I was surprised the following day when he said he felt slightly better, and yesterday I saw him again and he was able to use his overcoat, put it on and take it off, which he could not do before. I utter the prophetic statement that short wave therapy has come to stay because it is superior to conventional diathermy and possesses all the characteristics I have presented.

COMPRESSION FRACTURES: TREATMENT AFTER REDUCTION *

VAL PARMLEY, M.D., F.A.C.S.

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The extent to which machinery, gadgets and mechanics have entered into the treatment of fractures within the past few years is amazing. In fact, surgical judgment in the planning and execution of reduction and after-treatment is often lost in consideration of the many methods of application and uses of apparatus. Often before one knows it, one finds one's self depending upon a mechanical device loaded with set-screws, pins, nuts and bolts to accomplish reduction that could be more efficiently and simply done by the use of the surgeon's experienced hands and ingenuity.

Physical therapy has come in for more than its share of mechanical appliances and apparatus. Undoubtedly the mechanical age has exerted its influence upon this field to possibly a greater extent than most others. And concededly a great many of the devices have merit and are invaluable for the management of disease and injury. Gaenslen made a most pertinent observation when he said: "Physical therapy, the oldest form of treatment of the sick and injured, should need no one to champion its cause; nor would this be necessary had not unwarranted claims for agents as yet little understood brought disfavor upon the subject as a whole."

However, no specific device has been contributed to facilitate physical therapy in the after-treatment of compression fractures of the vertebral bodies. (In this paper fractures of the cervical and upper thoracic vertebral bodies are not considered, since obviously the treatment of injuries in those regions differs considerably from that of fractures in lower sections.)

In the great majority of these cases the injury is not a serious one and the reduction not difficult to accomplish even in what I have classified

* Read at the Fifteenth Annual Session of the American Congress of Physical Therapy, New York City, September 8, 1936.

as second and third degree types. Occasionally the compression usually occurring in first degree types, is impacted to such an extent that reduction is impossible. Most of us have our own preferred methods of reduction. My associate and I use a hammer and sandbag, with the patient in hyper-extension, as described in a previous article. In the rare cases with cord or associated injuries their gravity dictates primary as well as after-treatment, including physical therapy.

Our method of immobilization differs in that we do not often use an enveloping cast, but rather a strongly constructed posterior shell made to fit the patient. The after-treatment, including physical methods, is planned to conform to that type of immobilization. Patients like it because it is comfortable. No type of enveloping cast is comfortable and an appliance or device that is not reasonably comfortable is never entirely successful. One must have full co-operation of the patient, which is not difficult to secure provided the surgeon evinces personal interest in the patient.

Role of Physical Therapy

The object of physical therapy in these cases is to prepare the patient to assume his normal status as soon as possible after the period of necessary confinement. I believe most authorities are agreed that from eight to ten months is usually required to attain such an objective. This period can be reduced by two to four months through the early application of physical therapy.

It must be remembered that the body weight above the site of injury rests almost entirely upon the injured vertebral body, and that these bodies are constructed of the softest type of bone. For that reason union occurs quicker than in fracture of the shafts of long bones. But healing is by fibrosis, the same as elsewhere in the body. Therefore practically the same evolution is gone through in the process of bone repair, though the first stages are expedited because of the extent of rough bone surface involved. Moreover, there is usually very little displacement or separation of the fragments, such as in fractures of long bones. However, once healed the fractured vertebral body is certainly much stronger than previous to injury, for the reason that an irregular plate of cortical-type bone intervenes between the fragments, thus relieving part of the strain. This may be readily noted by study of the films of an old well-healed compression fracture.

Depending upon the degree of severity of the fracture, physical therapy may be instituted in from two to three weeks after immobilization. At no time have movements of the extremities been restricted. At first only simple arm and leg exercises together with deep breathing are allowed. These exercises are prescribed for ten minute periods four to six times daily, always under the supervision of a nurse or some other trained person. Gentle massage of the muscles of the extremities twice daily is also administered.

On the second or third day of these exercises the patient is given an explanation of their purpose. The responsibility is placed squarely upon his shoulders for carrying out these orders. Usually patients like to assume some responsibility under proper tutelage. It must be considered that these patients are not sick; they have little or no pain, and life under treatment becomes irksome, consequently they usually accept responsibility readily, though to keep them really interested the treatment must be progressive. Occasionally the more youthful patients rebel, which must be overcome by firmness. Frequently mental is as important as physical stimulation.

The second phase generally begins during the fourth week of immobilization. The arm and leg exercises are increased in intensity. That is to say the movements are practically the same, but counter-pull is added,

For this purpose we use strips cut from inner tubes (automobile or bicycle), the width depending upon the strength of pull desired. One end of each strip is tied to the head of the bed or over-head frame, if one is used, and a stirrup arrangement affixed to the other end at the proper distance to simulate the pedaling of a bicycle. For arm exercise the strips may be reversed. Since the patient is lying in a posterior shell he should be instructed not to bend forward for any purpose.

During this period the patient may be turned over on his abdomen with pillows under the chest and thighs to maintain the position of hyperextension. While in this position gentle vibratory or finger massage, or both, may be given the posterior tissues. The old stockinette may be replaced by clean material and reapplied to the shell before the patient is returned to his original position. Twenty to thirty minutes is sufficient time at first, but the periods may be gradually lengthened as time passes. The patient delights in these periods two or three times a day, feeling that real progress is being made. As a rule satisfied patients are easy to deal with and by this time they should have gotten over the fear associated with the term "broken back." Their morale must be kept up. They must be made to realize that they will not be hopeless cripples throughout the remainder of their lives, that in fact they will be as strong as before their accident.

We find that from seven to ten weeks of this relative immobilization, depending upon the degree of severity and age of the patient suffices. The last week in bed is spent without the cast, but boards are kept crosswise beneath the mattress to maintain a level surface. (Most hospital beds sag too much in the center, anyway.) During this week the patient is allowed practically the freedom of the bed. As a rule he will request and be given the shell to sleep in.

The patient is measured and fitted with a light corset-type brace with two light but strong chromium-aluminum-steel strips, one on either side of the mid-line, fitted to maintain the back in a slightly hyperextended position. Extreme hyperextension produces discomfort when he is standing, sitting or walking because it alters the posture too much, putting an unnecessary strain on the muscles of the back, hips and thighs, and causing painful muscle spasm. A heavy steel and leather brace of the Taylor type is unnecessary, since all that is required is to prevent hyperflexion of the spine. Obviously lateral flexion and rotation is inhibited to a sufficient degree to prevent any trouble from that source.

During the two to four months the patient wears the brace, massage and exercises of leg, arm and back muscles are prescribed for each night and morning. He is not required to sleep in the brace, but is cautioned to be moderate in his marital relations. The only recurrence I have had to deal with was definitely traceable to this source. The patient was a man, forty-eight years old, had a second degree type fracture of the body of the third lumbar vertebra, was immobilized ten weeks, and had a young wife. It occurred on the second night after he had left the hospital. I consider this instance worth noting.

During the two to four months following immobilization he is allowed to go about his usual duties if he is an office worker or a business executive. Certainly he cannot perform manual labor while wearing the brace, and it goes without saying that the first month out of bed is usually given over to recuperation.

I do not agree with those authors who attempt, through the use of plaster or a brace, to get the patient on his feet within two to five weeks following reduction, for no one has yet made a jacket or brace sufficiently effective for such a purpose.

This system of progressive physical therapy may be carried out almost as well when used following the reduction and immobilization methods of Davis, Dunlap, Watson-Jones and others who employ plaster shells or short enveloping casts.

Böhler stresses the importance of early and persistent physical therapy: "When a patient is put to bed in a plaster cast he is rendered both physically and psychically ill. The muscles become weak, the bones lose some of their calcium content, and the vertebral joints become stiff." On the other hand Eikenberry makes the terse statement that, "The only patients who were able to go back to hard work were those who were treated conservatively." Osgood finds that full function in these cases is restored in four to six months. McBride makes a distinction between compression of the body and comminuted fracture of the body as to type of injury, but none as to period of immobilization, period of observation and treatment, and period of compensable disability. For both he gives twelve weeks as the approximate period of immobilization or surgical care, thirty-two weeks as the approximate end of observation and treatment, and fifty-two weeks as ending the compensable period, or when the patient should be able to begin work. I do not altogether agree with these opinions. A mild first degree type of compression in my opinion certainly should be sufficiently healed to allow the patient to return to full function in twenty to twenty-four weeks, while it is conceivable that a severely comminuted third degree type of compression may require considerably more than a year for complete healing to take place. For purposes of compensation, though, I suppose a year is a fair average at which to strike. Somehow those cases up for compensation seem to have a great deal more trouble with their backs than those who are not, and to derive much benefit from the conclusion of their litigation. Moreover they are not nearly so co-operative.

Summary

1. Early gentle physical therapy is indicated in the after-treatment of compression fractures of vertebral bodies in the lower dorsal and lumbar regions when there is no evidence of cord involvement.
2. It is necessary to obtain the full co-operation of the patient. He should assume part of the responsibility for treatment.
3. Compression fractures of vertebral bodies without cord injury are not, as a rule, considered serious injuries. However, the element of time cannot be measured too greatly in the care and treatment because there have been recurrences from one cause or another.
4. Physical therapy is confined to the simplest, most primitive, and most effective methods.
5. Through properly applied physical therapeutic procedures the period required for treatment can be reduced by two to four months.

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MANIPULATIVE SURGERY IN CERTAIN LOW-BACK DISABILITIES *

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and

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Manipulative surgery has been long shrouded with a veil of empiricism and quackery. The medical profession, preoccupied with more scientific phases of therapy, has neglected it and permitted its relegation to irregular practitioners. Newer pathologic concepts, an abundance of clinical experience, and a delayed realization of the occasional efficacy and success of irregular medical sects, have convinced many of the medical profession of the therapeutic value of manipulation in selected cases.

Essentially, the closed reduction of congenital or acquired dislocations and of fractures is manipulative. By manipulative surgery, however, is usually meant the art and practice of moving joints for therapeutic purposes. Every movable joint has a certain range of motion, limited only by the character of the joint outline, its ligamentous structures, and the muscles which activate it. The purpose of therapeutic manipulation is to overcome resistance to the normal movement of a joint, where such vigorous measures are not contraindicated by the underlying pathologic process. A large group of acute and chronic disabilities are cured or benefited by this means, often when all other measures have failed.

For many years orthopedic surgeons have manipulated rigid feet, reduced dislocated semilunar cartilages of the knee-joint, and disrupted intra-articular and extra-articular adhesions of various joints with eminent success. Such maneuvers in disabilities of the spine have been avoided, largely because of the doubtful pathologic bases in many cases.

The lower spine in the human being is undergoing evolutionary changes and represents a *locus minoris resistentiae*. Stress, moderate or severe, direct or indirect, will not infrequently initiate pain, disability and deformity in this region. One must carefully exclude inflammatory, degenerative and neoplastic processes of the vertebral and paravertebral structures, where manipulation is contraindicated, and fractures, where reduction by specific maneuvers may be necessary and where immobilization is always essential.

Recent studies have emphasized (1) the significance of intervertebral disc pathology, with possible herniation into the vertebral bodies or posteriorly into the vertebral canal, or narrowing of the disc and intervertebral foramina with impingement of the exiting nerves, (2) the recognition of fractures of the accessory processes, laminae, pedicles, and articular facets of the vertebrae by special oblique roentgenographic views, (3) the early diagnosis of spinal cord lesions by careful neurological examination, spinal fluid and manometric studies, and contrast roentgenograms, and (4) the relation of certain alterations of the spinal and pelvic bony architecture to systemic disturbances of metabolic and endocrine origin.

With the exclusion of these cases there still remains a large group of low-back disabilities with an undetermined pathologic basis.

These are cases, acute or gradual in onset, frequently with an exciting traumatic factor, and with the clinical syndrome of localized discomfort in

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the lumbar, lumbo-sacral or sacro-iliac regions, scoliosis, and pain radiating along the course of various components of the lumbo-sacral plexus. Neurological and roentgenographic findings are usually negative. These cases are identified as strains or sprains and probably represent ligamentous and muscular tears of varying magnitude. Only the cervical spine lends itself, by the nature of its articular facets, to readily demonstrable luxations, partial or complete. It is not unlikely, however, that undue laxity of the periarticular structures of the articulations of the lower spine and sacro-iliac joints in this group of low-back derangements may allow subluxations or malalignments of contiguous articular surfaces, so imperceptible that roentgenograms do not disclose them. It is difficult to otherwise explain the phenomenal recoveries of certain of these cases following manipulative measures, immediate relief occurring not infrequently with a concomitant click or snap. With inadequate care these cases progress into a chronic stage, superimposed by the contractures of the previously torn tissues in the position of deformity, with pain and persistent disability.

Manipulative Methods

A variety of methods have been described, each contributor suggesting some favorite maneuver. Relaxation is a prime requisite, for manipulation must be forceful and discomfort or the danger of induced trauma should be obviated by satisfactory narcosis. Occasionally the manipulation may be performed without an anesthetic. The following routine or maneuvers is suggested.

1. With the patient supine and relaxed, the thighs, first one, then the other and then both together, are flexed very slowly at the hip-joints with the knees in full extension, to fifteen or twenty degrees less than a right angle. The lower extremity should be held in a neutral position or slightly rotated internally, to avoid undue stress on the femoral neck. Both thighs are then acutely flexed on the abdomen, with the knees in flexion.

The straight leg raising maneuver, through the taut hamstrings, causes motion of each innominate bone on the sacrum at the sacro-iliac joints, and the double maneuver causes also flexion of the pelvis on the lumbar spine, while the double knee and hip flexion position produces flexion in all the lumbar segments.

2. With the patient supine and the shoulders held firmly to the table by an assistant, the pelvis is rotated with force to the extreme right and left. This maneuver activates especially the posterior articulations of the lumbar vertebrae and lumbosacral joint.

3. With the patient prone, each thigh is slowly hyperextended, with counterpressure over the corresponding sacroiliac joint; then both thighs are hyperextended together with pressure over the lumbosacral region, and finally the entire pelvis is lifted from the table causing hyperextension of the lumbar spine. These maneuvers cause, first, torsion of each innominate bone on the sacrum at the sacroiliac joint, by traction through the taut ilio-femoral ligament and rectus femoris, then extension of the pelvis on the spine and hyperextension of the lumbar vertebrae.

Not infrequently, in one of these manipulations an audible or palpable click or snap occurs. The patient, if conscious, will often note immediate total or partial relief. As a temporary support, broad overlapping adhesive strips completely encircling the body, a plaster-of-Paris jacket, or a firm corset are applied at once, and in a few days, carefully controlled physical therapy, massage and exercises for the lumbar, abdominal and pelvic musculature are instituted. If only partial relief is secured or if there is recurrence, remanipulation is indicated.

In chronic cases, deep narcosis is essential and is best secured by nitrous oxide-ether anesthesia. The maneuvers already described are executed carefully and forcefully. The tearing of contracted ligaments and muscular elements is often audible or palpable, and these cases require immobilization for several weeks. We prefer plaster-of-Paris fixation, and feel that to immobilize the pelvis and lumbar spine properly, one or both hip joints must also be fixed. The patient is allowed up in four weeks with the plaster spica-jacket shortened to above the knee and in two weeks this is removed, an efficient spinal support is applied and mobilization instituted with massage and exercises. Any lateral deviation of the spine or loss of the normal curve is corrected at the time of manipulation and immobilization.

The recognition and the use of this valuable therapeutic measure by the medical profession, which is best equipped to employ it intelligently, is strongly urged. Far too-long neglected, it merits a definite place in the management of many resistant disabilities.

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SHORT WAVE DIATHERMY IN SUBDELTOID BURSITIS

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Bursitis, like inflammation elsewhere in the body, is accompanied by pain, tenderness, heat, swelling, and limitation of motion. In the acute stage the pain and tenderness may be very severe; in the subacute types, there may be intermittent pain, only slight tenderness, and limitation of motion may vary from slight to a considerable degree, dependent upon the degree of pathologic change in the sac. If the process has gone on to scar formation, with adhesions or calcification, there will be marked limitation of motion. Trauma, as well as other factors that lower local or general resistance of an individual, may play a causal role. A normal bursa, of course, is indispensable to smooth abduction and rotation of the shoulder joint. In a series of four hundred and fifty painful shoulders reported by King and Holmes, in seventy-nine and one-half per cent the most frequent cause was pathologic change related to the subacromial bursa. Codman states in part, that in the subacute or adherent type even without treatment, the disability seldom lasts over two years. Other authorities have reported definite evidence of disability even at the end of seven years. From the above statements we can infer that subacromial bursitis is a rather common, discomfiting and disabling condition which may last any number of years. A treatment for this condition that does not require hospitalization, is painless, clean, safe, easily applied, and capable of reducing disability to a minimum certainly is ideal. In physical therapy we have the method that meets with all these requirements.

I have followed and treated one hundred cases of subdeltoid bursitis within the last six years. Among the group, 99 were subdeltoid or subacromial and one was subcoracoid. The entire group manifested calcification of varying degree by x-ray examination. The average duration of the affection before being referred to me for treatment was from one to four weeks. All the cases had been carefully worked up previously. The diagnosis had been definitely established, various forms of classic treatment were

given and found wanting, including rest, splints, slings, internal medication (opiates and salicylates), external heat, massage, manipulation, aspiration, intravenous sodium cacodylate injections, novocaine injections into bursa, and surgery (drainage, curettement, or both).

I shall briefly touch on the various types of treatment along physical lines that have been used with some success: Moist heat, poultices, hydrotherapy, superficial dry heat (incandescent, tungsten, carbon filament, or infra-red lamp radiation), conventional diathermy alone or followed by galvanic ionization of sodium chloride, massage, manipulation and re-educational exercises. Many conservative, competent observers have reported excellent results with diathermy (with or without galvanism). Last but not least, I shall dwell upon the technic followed with the group of patients that I am reporting at this time. In my series, the 100 patients were divided into two equal groups. All patients received short wave radiation through the affected part with air vibration massage, manipulation and re-educational exercises for home use when the acute symptoms had subsided (pain, tenderness, and muscle spasm). Alternate cases received galvanic ionization in addition. The only contraindication to diathermy (long or short wave) is the presence of a purulent exudate which has been determined by general symptomatology or by local aspiration. In this group, surgery is definitely indicated.

Technic

The apparatus used was a 24 meter wavelength type. The patient was instructed to remove all clothes from the affected part. He was placed in a position that was found most comfortable to him, recumbent or sitting, with the elbow of the affected arm flexed and abducted resting on pillows. A rubber insulated inductance pad (electrode) covered by one inch of towelling or cotton wadding was interposed between it and the skin of the scapular region. Another pad of same type and size similarly prepared was placed in front of the affected shoulder, held in place by a sand bag. The current was then gradually turned on and adjusted until the patient felt a soothing, comfortable warmth or glow through the part under treatment. At all times certainty was had that the patient is comfortable with no prickling or burning sensation anywhere beneath the electrodes. I have been able to give from 700-1500 ma. of current at each treatment with low voltage. This treatment was given for twenty minutes. Then the anterior pad was removed and a rubber cuff condenser electrode was applied around the arm just below and humeral insertion of the deltoid muscle and treatment was repeated with this "hook-up" for twenty minutes more. The latter part of treatment just described was found especially useful and indicated in those cases where pain was referred to the upper arm and forearm. The affected part was then wiped dry of perspiration and rubbed with warm alcohol.

In the fifty alternate patients on whom galvanism was used, the procedure was as follows: Two moist canvas asbestos rubber backed electrodes were connected to a galvanic generator, the one attached to the negative pole was soaked in two per cent sodium chloride solution and placed on the shoulder in front and the positive pad was placed diametrically opposite on the shoulder in back as in the first application of the pads for diathermy. The galvanic current was gradually turned on until the patient felt a gentle, comfortable, soothing, tingling sensation of the skin under the pads. The dosage in our cases ranged from 10-20 ma. for about twenty minutes, the size of the pads being four by six inches. The part was then wiped dry and examined again for any evidence of skin irritation or burns. Everything being satisfactory and the patient having reached that stage in his condition where he had been relieved of his acute suffering (muscular spasm,

tenderness, and pain), gentle air vibration massage and active and passive motion of the shoulder were administered, together with gentle abduction, adduction, rotation, and gradual stretching. The patient was advised to rest and cool off before going out in the street, especially in inclement weather.

Treatments were given daily for the first week, then every other day for the next week, then twice weekly for the next two to four weeks or until functional restoration had been achieved. In this group there were ten patients, two of them physicians, who had had a previous subdeltoid bursitis treated by surgery. When the same condition affected the other shoulder, they refused surgery because they were not satisfied with the previous end result. They preferred a course of conservative physical therapy first, stating that if results were not satisfactory, then and then only would they consent to any further surgical intervention. Fortunately for them, our treatment was of great help.

Comment

1. Short wave therapy is a very satisfactory and conservative method in the treatment of subdeltoid bursitis and should be given a definite trial before other extreme measures are instituted.

2. Pain is relieved by three to six treatments.

3. Entire functional restoration is attained by ten to twelve treatments.

4. Chlorine ionization with negative galvanism was of no particular value in the solution of calcified deposits. The only values that I found for galvanism were in cases with pain referred to the arm, with beginning atrophy or nutritional disturbance in the musculature about the joint, in which it manifested vasodilator action on the capillaries of the skin, thus perhaps prolonging the hyperemia produced by short wave diathermy.

5. Short wave radiation offers a definite, logical, scientific approach in the treatment of this condition, reducing the period of pain and disability to one-third the time of other classic methods, and resulting in a good functional restoration. The effect, in my opinion, is due to the deep heat and profound active hyperemia in the tissues stimulating circulation, with relaxation of musculature (thus reducing spasm), increase of drainage, removal of waste products of exudation, relieving tension on the walls of the bursa and pressure upon sensory nerve ends. There is also said to be an increased leucocytosis and phagocytosis in cases with an infective basis, stimulating nature in the process of inflammation and acting as a very useful adjunct. When the pain has been relieved, massage (active and passive), manipulation, and restorative exercises further aid in the rehabilitation of the injured member.

6. Disappearance of calcification is not a criterion as to whether or not a satisfactory result has been accomplished. Numerous observers report many patients who accidentally have been found to have calcification without having manifested any symptoms pointing to an affected bursa. Calcification must have been present in a dormant state for many years previous. Twelve of this series, upon discharge, were normal so far as subjective, objective, and functional symptoms were concerned, yet despite conscientious and active treatment no apparent reduction of calcified deposit was evidenced by x-rays. (A possible explanation by some authorities has been that the deposit consisted of fat and cholesterol rather than lime.)

7. Not one in this group at any time required any vigorous manipulation or breaking up of adhesions under anesthesia or surgery, as has been advocated by others.

8. The only contraindication to the use of diathermy (long or short wave) could be the definite presence of a purulent exudate in the sac.

Summary

The constant use of various physical measures in the treatment of various diseases and injuries related to industry over a period of 16 years on thousands of patients has convinced me that my results obtained with short wave therapy have been far superior for the following reasons:

1. Ease and simplicity of application.
2. Greater power of penetration and greater volume of current used under proper technic.
3. Duration of treatment decreased; intervals increased (economic factor in a busy clinic).
4. All things being equal, the shorter the wavelength and the greater the frequency, the deeper the penetration.
5. The cuff and cable (coil) method of administration was far superior to the pad method for depth effect.
6. In twenty-five thousand short wave treatments, given to both animals and men over a period of four years, under my supervision, not a single burn has occurred, while with conventional diathermy, despite greatest caution we have had some burns.

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TREATMENT OF CUTANEOUS TUBERCULOSIS *

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The cutaneous lesions resulting from the reaction between the tubercle bacillus and its host vary markedly in appearance. There are so many entities described under cutaneous tuberculosis that it is difficult to establish a uniform classification. These different types have been classified, 1, according to histologic changes; 2, according to immunologic reactions and, 3, according to clinical types.

Gans divides cutaneous tuberculosis into 2 large groups.

A. Localized types spreading from the first infected spot.

1. Lupus Vulgaris.
2. Tuberculosis Cutis Verrucosa.
3. Scrofuloderma.
4. Tuberculosis Cutis Ulcerosa.

B. Hematogenous types.

1. Acute cutaneous miliary tuberculosis (not limited to the skin, develops chiefly in children and death results from tuberculous meningitis).
2. Papulonecrotic tuberculid. (It is a tuberculous septicemia found usually in adults and the patients usually are not sick.)
3. Lichen scrofulosorum.
4. Lupus follicularis disseminatus.
5. Tuberculosis cutis indurativa.
 - a. Erythema Induratum of Bazin.
 - b. Sarcoid Darier-Roussy.
 - c. Sarcoid Boeck.
 - d. Lupus Pernio.
 - e. Angiolupoid of Pautrier.

Granuloma annulare, lichen nitidus and lupus erythematosus are not included in this classification as they have not been proved to be tuberculous in character.

These various entities are caused by the tubercle bacillus. The differences in clinical and histologic characteristics can be accounted for by the differences in immunologic reactions, attenuation of organism, environmental factors and the like. On this basis, I prefer to classify the entities of this group in the following manner:

A. True Tuberculosis.

1. Lupus Vulgaris.
2. Lupus Miliaris Disseminatus.
3. Tuberculosis Verrucosa Cutis.
4. Tuberculosis Cutis Orificialis.
5. Scrofuloderma.
6. Acute Cutaneous Miliary Tuberculosis.
7. Lupus Vulgaris Erythematodes of Leloir.

B. Tuberculides.

1. Papulonecrotic Tuberculide.

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2. Rosacea-like Tuberculide of Lewandowsky.
3. Erythema Induratum of Bazin.
4. Lichen Scrofulosorum.
5. Lupus Pernio.
6. Sarcoid of Boeck.
7. Sarcoid of Darier Roussy.

C. Doubtful Tuberculous Conditions.

In this group are included diseases which were thought to be tuberculous, but in which the clinical, pathologic, bacteriologic and immunologic evidence is not sufficient to permit us to ascribe the etiologic role to the Koch bacillus.

1. Lupus Erythematosus.
2. Granuloma Annulare.
3. Erythema Nodosum.
4. Lichen Nitidus.
5. Acne Cachecticorum.
6. Acne Varioliformis.

Among the true tuberculosis of the integument are all those conditions in which the bacillus of Koch is frequently found or in which positive animal inoculations have been obtained. Other manifestations of tuberculosis may be present, but they may be considered only presumptive evidence of tuberculosis. These are:

1. Histologic structure in conformity with that of tuberculosis.
2. Positive local reaction to tuberculin.
3. The co-existence of undoubted tuberculous manifestation in other organs.

How do the tuberculides differ from true tuberculosis? There is no unanimity of opinion as to where the line is to be drawn. We shall consider here among the tuberculides many dissimilar dermatoses whose characteristics are not unlike those present in true tuberculosis. Tuberculides are usually multiple and disseminated by the hematogenous route. Some have considered that the tuberculides are caused by attenuated tubercle bacilli, others have thought that a substance liberated from tubercle bacilli (virus or toxin) at a distant focus is the cause. This virus or toxin circulating in the blood stream accounts for the symmetry and dissemination of the tuberculides. The theory of some authors is that tuberculides are caused by emboli of dead or attenuated tubercle bacilli from some primary focus. There is a group of clinicians that believes that anaphylactic reactions to the bacillus of Koch is the cause of these lesions. These views require definite scientific confirmation.

The relationship of the tuberculides with tuberculosis is proved by the following features:

1. The tuberculides are frequently associated in one and the same individual and often co-exist with glandular, bony, serous, visceral or cutaneous tuberculous manifestations, or the patients have a tuberculous history, or are found to be tuberculous later on.
2. The histologic structure of the tuberculides is sometimes typically tuberculous.
3. As a rule tubercle bacilli are not found in tuberculides. However, Gougerot produced lesions which he regarded as identical with tuberculides by rubbing pure cultures of Koch's bacilli on the shaved skin of guinea pigs.
4. Tuberculin reactions in some of the tuberculides are identical with those obtained in some of the true tuberculosis.

It is not within the scope of this paper to discuss the pathology, the symptomatology or the diagnosis of cutaneous tuberculosis. It was thought,

however, necessary to mention the entities included in this group. The purpose of this paper is to discuss the physical measures used in the treatment of cutaneous tuberculosis. Other forms of therapy are also enumerated, but not described in detail.

True Tuberculosis of Skin

Lupus Vulgaris. — Treatment depends upon the type and location of the lesion and the general condition of the patient. The best results are probably obtained with the Finsen light. This treatment so far as I know is not given in this country. The most favorable reports in the treatment of lupus vulgaris originated in Copenhagen. This is due, no doubt, to the fact that the Finsen light is used so extensively in that city. Generalized ultraviolet radiation and natural heliotherapy probably do more for this disease than any other form of treatment. The exposures are given daily over a period of months or for a year or two to the entire body in suberythema doses. Small circumscribed lesions in favorable locations may be treated with the water-cooled ultraviolet lamp (Kromayer). When this method is used, the dose administered is sufficient to cause blistering. To save time, the lamp may be held in contact with or without pressure. For this purpose fused quartz applicators may be used. A second treatment is not administered until the reaction from the previous one has subsided. The applications are repeated until the lesion disappears.

Along with generalized or local heliotherapy, patients should be put on the Gerson-Hermansdorfer-Sauerbruch diet. This is a sodium chloride poor diet with increase in vitamin and calcium and phosphorus intake. Attention to general health, rest, and climate is essential.

Internal medication is of little help. Arsenic, cod liver oil, viosterol and other vitamin products appear to be of value in some cases. There is no specific remedy. Therapy by means of graduated tuberculin injections is helpful in some cases. It is now being used more extensively than formerly. Radium and x-rays are efficacious in the treatment of lupus vulgaris but radiation sequelae frequently follow their application.

Small lesions in favorable locations may be destroyed in a number of ways. Under local anesthesia, they may be curetted and painted with full strength lactic acid; or they may be cauterized with the actual cautery or electrocautery. If carbon dioxide refrigeration is used, anesthesia is not necessary. "Dry ice" or "snow" collected in an appropriate applicator using the Lortat-Jacob apparatus may be applied. The "dry ice" is preferable where obtainable. It is shaped to the size of the lesion and it is held in contact with firm pressure from 15 seconds to one minute depending upon the size and the thickness of the lesion. Inflammation and vesiculation occur and as soon as the reaction subsides, another treatment is given. It generally requires several applications to bring about involution of a lesion. The resulting scar is generally soft and pliable.

Surgical diathermy is probably the best agent in the treatment of small localized patches of lupus vulgaris. If the lesion is superficial, it may be lightly electrodesiccated with the Oudin current under local anesthesia. Deeply infiltrating lesions are best treated with the monopolar, or hipolar coagulating high frequency current. It may even be excised with endothermy or by cold surgery. Results with chemical cauterants, ointments, and the like are generally poor. We have not had sufficient experience in the treatment of cutaneous tuberculosis with cold quartz ultraviolet generators to evaluate their merits.

Tuberculosis Verrucosa Cutis. — Usually a solitary lesion appears somewhere on the hands or other part of the body as a result of direct inoculation

with Koch's bacillus. This disease occurs in medical students and pathologists who dissect and perform autopsies without using gloves; butchers and slaughter house men who may be working on infected animals, and in patients with pulmonary tuberculosis who infect themselves with their own sputum.

If the lesion is in a favorable location it may be excised with the scalpel or by endothermy under novocaine anesthesia. This method has the advantage of completely destroying the lesion rapidly. The condition may also be eradicated by the Kromayer lamp with pressure or with solid carbon dioxide. Warty tuberculosis of the skin responds rather well to roentgen irradiation. An erythema dose is administered and repeated in one month if necessary. About 300 r are given at one sitting using about 100 kv, 2 ma. and no filter.

Tuberculosis Cutis Orificialis. — This form of tuberculosis affects the orifices of the body as a direct extension of tuberculosis from one of the viscera. Orificial tuberculosis of the tongue, mouth or nose is caused by a direct extension of pulmonary tuberculosis. Tuberculosis of the meatus of the urethra is secondary to a Koch infection of the bladder or kidney. When tuberculosis involves the orifices by direct extension it indicates diminished or complete absence of immunity and therefore this type of acid-fast infection represents the terminal stage of visceral tuberculosis. Efforts to cure the local infection are of no avail except to relieve symptoms.

Patients with orificial tuberculosis are treated mainly for their primary visceral infection and require hospitalization or sanatorium treatment. The cutaneous lesions for the most part respond to roentgen radiation. A single dose is usually sufficient. At times several doses are required. An erythema dose of unfiltered radiation is given at one sitting and repeated again in one month. About 300 r are administered using about 100 kv and 2 ma. Some recommend excision, others carbon dioxide refrigeration; electrical or chemical cauterization; endothermy and coagulation. While these methods are successful in some cases, I believe that for the majority of the patients, destructive methods are contraindicated. They add to their discomfort and the tissues tend to heal extremely slowly. Ultraviolet radiation from whatever source should not be used in active progressive cutaneous tuberculosis co-existing with active visceral acid-fast infection.

Scrofuloderma. — Fortunately this form of tuberculosis is far less common than formerly. The disease is caused in the majority of the patients by the bovine tubercle bacillus.

The best treatment is prolonged ultraviolet radiation both general and local. The results seem to be about the same with natural heliotherapy as with carbon arc or air-cooled mercury quartz lamps. Some localized cases appear to heal more rapidly under the influence of the water cooled mercury quartz lamp. In addition, care of the general health including rest, favorable climate and wholesome diet, is important. Many cases have responded quickly when ultraviolet radiation was combined with the Gerson-Hermannsdorfer-Sauerbruch diet. Occasionally roentgen rays will cause recalcitrant lesions to heal more rapidly and suppuration and sinus formation will be checked. If caseation and central softening have already started, x-rays will not prevent sinus formation. In this instance aspiration or excision with classic or electrosurgery is indicated. Small superficial lesions may be coagulated or excised by endothermy.

Acute cutaneous miliary tuberculosis is a general medical problem and therefore will not be discussed here. Physical therapeutic measures are of no avail, as all these cases end fatally.

Lupus vulgaris erythematodes of Leloir is a rare disease. Biopsy is

often necessary to make a diagnosis. This condition may be treated the same as lupus vulgaris.

Lupus miliaris disseminatus and lupus miliaris faciei disseminatus have been considered as tuberculides but in view of the fact that the pathology is constantly tuberculous and frequently resembles lupus vulgaris, it may be considered as a variety of lupus vulgaris. The treatment therefore in general may be the same as described under lupus vulgaris. However, many cases of lupus miliaris disseminatus respond well to intravenous injections of gold or to tuberculin. Many lesions undergo spontaneous involution.

Tuberculides

Papulonecrotic Tuberculide is of comparatively short duration. Generalized and local ultraviolet radiation and the administration of cod liver oil or vitamin concentrates, or small doses of arsenic will cause the lesions to involute rapidly. Locally cod liver oil ointment or 5 per cent ammoniated mercury ointment is valuable.

Lichen Scrofulosorum is a rare condition lasting several weeks to several months. It tends to heal spontaneously. The subjects are usually tuberculous. The treatment is the same as that for papulonecrotic tuberculide.

Rosacea-like Tuberculide of Lewandowsky markedly resembles acne rosacea. There are more cases of this condition than the literature indicates. Many of them are undiagnosed. This condition does not respond to roentgen therapy or to mild doses of ultraviolet radiation. A dose sufficient to produce a marked reaction administered with the water cooled ultraviolet lamp yields favorable effects in some cases. The best results have been obtained with injections of tuberculin or of gold. General hygienic measures, rest, cod liver oil and good wholesome food are essential. Some improve when put on the Gerson-Hermansdorfer-Sauerbruch diet.

The best treatment for Erythema Induratum of Bazin is local and generalized ultraviolet radiation with the air cooled mercury quartz lamp, elevation of the affected extremities and the administration of tuberculin. All foci of infection should be attended to. Careful examination for visceral, particularly pulmonary tuberculosis should be made. Tuberculin is given at intervals of five to seven days and ultraviolet radiation in suberythema doses at a distance of 20 inches as near daily as possible. During the acute stage of the disease rest in bed is essential.

The sarcoids vary in size and shape, the number of the lesions ranging from one to several hundred. Small single lesions may be excised by classic or electrosurgery. As a rule the response to ultraviolet radiation is poor. Roentgen rays are more efficacious. For superficial lesions unfiltered fractional (75 r) weekly treatments are given. About 100 kv. and 2 ma. are the factors employed, 3 mm. al. or its equivalent being usually employed with 140 kv. and 5 ma. for deeply infiltrated plaques.

The best results are obtained when x-rays are combined with arsenotherapy either in the form of Fowler's solution by mouth, 2 per cent solution of sodium arsenate by subcutaneous injections, or as neocarsphenamine intravenously.

Doubtful Tuberculous Conditions

Lupus Erythematosus is not definitely tuberculous. Many believe that it is a streptococcal infection, with foci playing an important role. There are many other factors that appear to cause lupus erythematosus, too numerous to be mentioned here.

There are two main types of the disease, the discoid and the disseminated variety. The former is the more common type. The typical case is

represented by a butterfly shaped eruption, involving the nose and cheeks. It usually starts in the second and third decades of life. The color of the eruption is violaceous or reddish brown. There are adherent firm thin scales that project into the follicular openings. The follicular openings are enlarged. Telangiectatic vessels are very numerous. The lesions are sharply circumscribed, and when they heal, atrophic scarring results. Many of these patients manifest a low actinic toleration.

The most important point to emphasize is that generalized ultraviolet radiation, natural or artificial, is contraindicated. Exposure to the sun may transform a discoid type into a disseminated type and may even cause death. The discoid type may be treated with destructive doses of Kromayer light. The best agent for this purpose seems to be solid carbon dioxide. Good results have been obtained with injections of gold sodium thiosulphate. To begin with 5 milligram doses are given intravenously every 5 to 7 days. The dose is gradually increased up to a maximum of 50 milligrams. The salt is dissolved in 2 to 4 cc. of distilled sterile water. The drug may be given in courses of 15 injections, with rest periods between them. Some give gold subcutaneously and others inject it right into the lesions. The drug is not entirely safe. Susceptible individuals show marked cutaneous, gastrointestinal and general reactions including serious changes in the blood picture. Gold sodium thiosulphate or other gold compounds should not be used by those not familiar with its contraindications and its toxic effects.

In most cases the best treatment for the discoid type of lupus erythematosus is the intravenous administration of gold combined with solid carbon dioxide locally. Intramuscular injections of bismuth and the application of bismuth locally yield good results in some cases. Sometimes bismuth and gold are injected alternately. Other times either one or the other of these injections are given together with some local destructive agent, such as curettage, coagulation, carbon dioxide, Kromayer light, 25 per cent pyrogallic ointment and similar procedures.

A simple treatment which is often effectual is the Hollander treatment which consists in the oral administration of $7\frac{1}{2}$ grs. of quinine three times a day, and at night of the application of tincture of iodine to the affected areas. Instead of the tincture of iodine, lotio alba may be used. X-rays are effective in selected cases. Small lesions may be destroyed by electrocoagulation or excised by the scalpel or the electrotome. They may also be destroyed by cross scarification with the scalpel or by mild endothermy.

Improvement in general health, removal of foci of infection, administration of a tonic containing arsenic and iron, a diet high in vitamins, elimination of stimulants and highly spiced foods, and prolonged hours of rest are important in the treatment of this recalcitrant disease. The disseminated variety should be treated conservatively and with great care. Protection against actinic rays is essential.

Granuloma annulare, erythema nodosum, lichen nitidus, acne cachecticorum and acne varioliformis are not truly tuberculous. Granuloma annulare and lichen nitidus sometimes respond exceedingly well to roentgen irradiation. The treatment of choice for acne cachecticorum is x-rays. Acne varioliformis may be treated with unfiltered x-rays or with ultraviolet radiation. Many cases respond well to a white precipitate ointment. Ultraviolet radiation is of value in the treatment of erythema nodosum.

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X-RAY TREATMENT OF CERTAIN SKIN AFFECTIONS *

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X-rays are one of the most important remedial agents of the dermatologist, as a great many dermatoses are amenable to roentgenotherapy. But there are some affections of the skin which strikingly respond to this treatment, such as acne vulgaris, hidrosadenitis axillaris and pruritus ani et vulvae. I have found that x-rays are the most reliable agent in the treatment of these conditions and noted repeatedly the relatively rapid alleviation of physical and mental suffering produced by these affections. The purpose of this paper is therefore to call attention to the extraordinary value of this remedy in these three dermatoses.

Acne Vulgaris

This condition has an important bearing on the mental health and happiness of the individual, especially during adolescence and young adult life. Quite a few suffer from mental depression and a sense of inferiority, as the disfiguring lesions commonly affect the face. It is amazing that many patients with acne vulgaris of long duration have not been treated because of the belief of relatives and some physicians that the patient will "outgrow the trouble."

Attention should be given to the general condition of the patient such as removal of focal infection and regulation of the gastrointestinal and genitourinary functions. In some cases general hygienic measures and application of simple dermatologic remedies will improve or cure acne within a few months or years. In the majority of cases, however, x-ray radiation is necessary and a cure may be obtained within four to six months with a high degree of certainty.

It is important to know that menstrual acne, which is characterized by a sparse eruption located mostly on the chin, and aggravated during menstruation, is resistant to x-ray therapy. Similarly stubborn are some very mild cases which present very few comedones and pustules, and so-called seborrheic acne which is characterized by occasional comedones and pustules, numerous nodules and excessive oiliness. In these cases one should not depend solely on x-rays. Neurotic excoriations, which are frequently

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associated and confused with acne should be recognized and treated as such.

The action of x-rays on acne consists in controlling and diminishing excessive secretion of the sebaceous glands. The formation of comedones, the primary lesions of acne vulgaris, is prevented. Consequently papules and pustules, which frequently lead to scar formation of the face, back or chest are obviated. This explains the advisability of treating acne vulgaris in its early stages before many lesions have scarred the patient physically and mentally.

Unfiltered x-rays are given in doses of one-eighth to one-quarter of a skin unit once weekly, from twelve to sixteen treatments. Slight recurrences which may take place a few months later are, as a rule, readily controlled by a few additional exposures.

It is wise to heed the warning of MacKee¹ "that one must know when to discontinue treatment, that to completely cure the disease, to prevent even an occasional lesion, one might in many instances require radiation to the point of injury."

Hidrosadenitis Axillaris

The second affection in which, in my experience, x-ray treatment never has failed to produce a spectacular cure within one or two weeks, is hidrosadenitis axillaris, to which Lane² has recently called attention. This condition which was called by Velpeau³ "tuberculous abscess of the axilla" and by Verneuil⁴ "phlegmonous hydrosadenitis" has the clinical picture of furunculosis. It differs, however, from the common furuncle by infection of the sweat glands instead of the pilosebaceous follicles. This explains the obstinacy of this affection and its tendency to become chronic, as involvement of the large coil glands renders drainage difficult. These glands are the so-called apocrine glands of Schiefferdecker⁵ which are situated in the axillae, about the anus, scrotum, areolae and labia majora. While as a rule the axillae are involved, occasionally other regions are also affected.

The clinical course of this affection is as follows: There is first slight subcutaneous induration with little or no redness of the skin and slight tenderness to pressure with pain on moving the arm. After a few days when the swelling enlarges and the overlying skin becomes inflamed, spontaneous pain and tenderness increase. There is then no sign of fluctuation and absorption is still possible, usually however the skin soon becomes dusky red, breaks and discharges a small quantity of pus. In spite of suppuration the induration and pain increase, and while one or a few of the nodules may disappear new lesions form and the process may continue for many months. Surgical treatment, if it should be efficacious, must consist of radical removal of these nodes, which necessitates general anesthesia and interferes with the patient's activities. The danger of removal of the lymphatic glands of the axillae and the resulting obstruction in the lymphatic circulation of the arm should also be considered.

The markedly favorable effect of x-rays on this affection, as on local furunculosis, is not due to the influence of radiation on the invading organism, since the x-rays are not bactericidal. It may be explained, as MacKee⁶ has suggested, by the increased resistance of the tissues to the invading organism through some biochemical alteration or by inhibition of the reactive factor instead of the etiologic factor.

The dosage depends upon the stage in which the disease is first observed. In the early stages when there is only induration without suppuration, one suberythema dose may abort the lesion and prevent recurrence. Instead of a suberythema dose fractional doses may be given once weekly which will bring about gradual resolution of the lesion. When suppura-

tion takes place small doses may be given twice weekly. X-rays filtered through three millimeters of aluminum are advised with the purpose of producing atrophy of the sweat glands, and thus preventing reinfection. In many cases the inflammatory infiltration will disappear without breaking down or, if the process has progressed too far, abscess formation will be hastened. Usually four to five one-quarter erythema doses given within a few weeks will produce a cure.

Pruritus Ani et Vulvae

Anal pruritus in women is usually combined with more or less vulvar pruritus. In males, however, it is usually not associated with scrotal pruritus. This affection produces much suffering, and ruins the health of the patient also by causing insomnia. It produces an irresistible desire to scratch and the patients excoriate the skin to the point of bleeding. This traumatism forms a link in the vicious circle, for the excoriations are an exciting factor of the pruritus.

Two types of localized pruritus are to be differentiated. In the secondary type the pruritus is due to some definite local cause like eczema, lichen planus, dermatophytosis, oxyuris vermicularis, or to some general affection like diabetes and achlorhydric anemia (Swift).⁷

The other type is the so-called essential or primary pruritus, where no local or general cause can be detected. While secondary pruritus is readily amenable to treatment by removal of the local pathologic condition or by alleviation of the general affection, the essential pruritus is the one which interests us here, particularly because of the severity of the symptoms and its resistance to simple treatment.

Montague⁸ believes that in the majority of cases the pruritus is due to a coloproctitis, anal fissure, fistulas and hemorrhoids and finds that food allergy and pelvic visceral diseases are factors which are often overlooked.

Mason⁹ considers small shallow ulcers between the sphincters and an unusual amount of moisture from the bowels above as the cause of the pruritus.

Scarborough¹⁰ discards all etiologic theories other than that of an abnormal anal condition which interferes with the proper closure of the upper level of the anal canal, thereby enabling irritating rectal secretion to seep into the anus, thus producing ulcers, erosions, and fissures with consequent irritation of underlying nerve bulbs. Relaxed sphincter, hemorrhoids or hypertrophic papillae may interfere with such closure.

Pusey¹¹ believes that the irritation of fecal residues on the skin is responsible for a great many cases, even in clean persons, and finds that treatment based on that view is more successful than any other. According to his view pruritus vulvae may be a sequence of pruritus ani and may be produced by the same cause. It may be due also to uterine or ovarian disturbances, to cervical and perineal tears, and to chronic vaginitis or urethritis.

Buie,¹² however, states that "it is doubtful if true cases of anal pruritus are often due to such causes as anal fistulas and fissures, ulceration of anus and rectum, malignant and benign polyps, hypertrophy of the papillae and varicosities."

In the majority of cases seen by the dermatologist no pathologic condition mentioned so frequently as causative in text books and articles can be ascertained as the cause of pruritus. This is confirmed by the findings of O'Donovan¹³ who in eighty-three cases of pruritus ani et vulvae has found no palpable cause for this affection. He believes that cases in which a local cause is found must be rare, as in the great majority of instances, after having made the most careful search he failed to find any local defect.

MacKee¹⁴ states that he has treated 210 cases of regional pruritus mostly of the anus and vulva in which no cause could be found. I too, have found in cases of marked pruritus ani et vulvae which have lasted for many months or years, no palpable cause for this condition except marked nervous tension, which leads me to believe that essential local pruritus is connected in some way with a disturbance of the general nervous system.

Lockhart-Mummery¹⁵ considers the severe cases of pruritus ani of long standing as an actual disease of the nerve endings. This was first realized by Charles Ball¹⁶ whose operation is based on this conception.

Locally there is variable thickening of the anal folds and a few linear superficial erosions of the skin between the folds. In some cases of long duration the skin is dry, parchment-like and depigmented.

Some of these patients have been treated previously by the proctologist for hemorrhoids, or by the gynecologist for leucorrhoea. I am convinced that these conditions are not responsible for the pruritus as frequently as is maintained, as I have seen patients with untreated hemorrhoids relieved of the pruritus by x-ray treatment.

My conception of pruritus ani et vulvae has been that the threshold of irritability which is commonly low in the anal and genital regions is particularly low in patients whose nervous system is markedly disturbed. It is possible that these cases of essential pruritus have started as secondary to some local or general cause and in spite of the removal of this cause the pruritus has persisted (Mason⁹). Based on this conception treatment should consist in addition to the x-rays, in lessening the general nervous tension in order to decrease irritability and thus heighten the threshold of intensity of irritation necessary to produce this sensation. The patients are urged to avoid stimulants, such as alcohol, coffee, tea and tobacco, and to spare their nervous system by avoiding worry and undue excitement. On the other hand, any local pathologic lesion which may act as an exciting cause should be remedied, besides removal of any distinct defect by the proctologist. I therefore follow the advice of Pusey and lay great stress on instructing the patients to keep the parts affected rigidly clean by gentle frequent washing with soap and water, particularly following defecation.

The dosage of x-rays is one-quarter of a skin unit unfiltered, given at weekly intervals for about six or eight treatments. Some of these patients who have been suffering from pruritus ani et vulvae for years respond even to as little as four weekly fractional doses. It is the experience of MacKee¹⁷ that if the itching cannot be arrested by a quantity of x-rays insufficient to produce erythema, a larger dose would also fail. The great majority of cases of pruritus ani et vulvae have responded, in my experience, to at most ten fractional doses of x-rays. A few patients with a marked neurosis have not responded satisfactorily. I am convinced that x-ray treatment is the method of choice in this condition. Of course, every patient should be exhaustively examined for any other pathologic condition mentioned above, however rare its occurrence may be. In cases which show distinct neurosis, psychiatric treatment should be instituted.

The combination of x-rays with hygienic measures will cure the condition rapidly and recurrences will be rare and controllable. Injections of alcohol and particularly surgical measures as advised by Ball¹⁶ should be the last resort. This remarkable effect of the x-rays on essential pruritus ani is difficult to explain. I share MacKee's view who states that "if it can be assumed that itching is due to alteration in the collagen or in the sensory terminals or fibrils it is conceivable that radiation acts by inhibiting chemical action and cell proliferation."

In discussing the above dermatoses, little mention has been made of the inherent dangers of x-ray therapy. I admit that the rays are a dangerous therapeutic agent, but only in unskilled hands. The physician who employs this method should have not only thorough training in its use but also a clear concept of the dermatologic lesion. Only thus may radiodermatitis be avoided. This was aptly expressed by O'Donovan who stated that "the use of x-rays must be controlled by the dermatologist, for only in this special department of medicine is the tradition of its danger duly established and only radiologists accustomed to working with dermatologists are thoroughly familiar with the technic of small fractional doses together with the insistence on safe time intervals between one treatment and another."

Summary

Acne vulgaris, hidrosadenitis axillaris and pruritus ani et vulvae have been selected from among many dermatoses because of their particularly beneficial response to x-rays. It is the experience and conviction of the author that x-rays are the therapeutic method of choice in these conditions. They should be used early enough in acne in order to prevent mental and physical damage, and should be given a fair trial in pruritis ani et vulvae before any surgical measures are employed. Attention is called to the advisability of the x-rays being used in skin diseases by the dermatologist and not by the radiologist. For dermatologists only have a thorough knowledge of the skin lesion and at the same time are trained in the special technic of x-ray treatment of dermatoses. The dangers of this powerful remedy will thus be minimized.

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FURTHER STUDIES WITH TRANSCEREBRAL DIATHERMY *

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Two years ago we presented a preliminary report on the treatment of hemiplegia by transcerebral diathermy, and also a summary of experimental work to determine the effect of the current upon brain and body temperature of dogs. The present discussion represents the continuation of the studies of hemiplegia and other chronic brain disorders with additional information gained through more detailed animal experimentation. The number of cases included is not large and a statistical analysis is not presented. The original group of patients has, in the main, remained under observation and treatment and through these, and the more recently added cases, we have attempted to more clearly define the physiologic effects, indications, and limitations of this method of treatment.

Vascular lesions of the brain frequently produce lasting symptoms because of its inaccessibility and its minimal collateral circulation. The prognosis for restoration of function following such lesions is dubious and becomes increasingly more grave the longer the symptoms last. The histologic picture of brain softening affords no basis for optimism with any form of therapy, but in the marginal portions of such a lesion there are cells in various stages of anoxemia in which a restoration to normal is possible if adequate circulation can be established. Pfeiffer¹ points out that cortical brain vessels are not end vessels and a moderate amount of collateral circulation may be made effective. With a hope of restoring such non-functioning but still viable cells, we used transcerebral diathermization in a group of hopeless hemiplegics. Encouraged by the fact that the method was practical and without danger, and that a clinical effect was demonstrable, these studies were continued.

Our earlier report included observation of a group of chronic hemiplegics treated over a period of approximately one year, with some animal work to confirm the intracranial physiologic conditions during treatment. Since then patients with other chronic diseases of the brain have been treated and more detailed experimental work has been done.

For treatment metal electrodes measuring two by four inches have been applied to the forehead and occipital region, well lubricated by KY jelly to insure even heat distribution. The current used was of medium voltage, beginning with 500 to 600, gradually ascending to 1200 to even 1500 milliamperes. The period of treatment has been increased from initial 15 to 20 minutes to one hour or longer, with due consideration of the patient's comfort. Upon the termination of each seance the patient was encouraged to rest for 15 to 30 minutes. Treatments as a rule were given three times a week.

In the experimental dogs a large trephine opening was made over the midoccipital region, with the dura left intact and full postoperative recovery allowed. At the time of observation the skin over the cranial defect was shaved and thoroughly sterilized. The animal was well anesthetized by the intravenous injection of dial, the electrodes were applied laterally and the thermocouple needle introduced to a depth of from 3 to 4 cm., depending upon the size of

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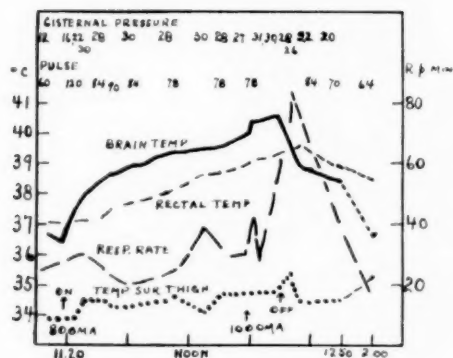


Fig. 1

Fig. 1. — Effect of transcerebral diathermy on animal. There is shown an increase in cerebrospinal fluid pressure, pulse and respiratory rate, brain, rectal and surface temperature; base of graph indicates milliamperes used.

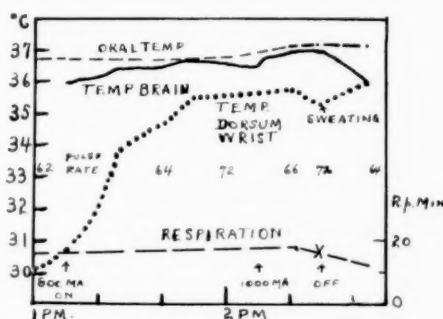


Fig. 2

Fig. 2. — Effect of transcerebral diathermy on man. The oral and brain temperature showed a slight elevation; surface temperature was markedly increased; there was no change in respiration.

the head. Rectal temperatures were obtained by a rectal thermocouple inserted a distance of 10 to 15 centimeters, and surface temperatures by a surface thermocouple. All the thermocouple leads were connected with the thermoelectrical apparatus of Bazett and McGlone. Readings were taken at varying intervals and simultaneous observations of pulse, respiration and spinal fluid pressure were made. Spinal fluid pressure readings were mainly from the cisterna magna, a location which one who has attempted spinal punctures on dogs will appreciate.

Figure 1 represents a single experiment on Dog No. 2-B. It will be noted that basal readings were made for a time before the actual experiment. As the current was turned on there was a prompt rise of brain temperature and cerebrospinal pressure with a slower rise of body and surface temperatures, pulse and respiratory rate. As a constant milliamperage is maintained there is a tendency for the spinal fluid pressure and brain temperature to plateau, but with an increase in the amperage another rise occurs in brain temperature and cerebrospinal pressure. As the body temperature later increases, panting begins in an attempt to control the excess generation of heat. Signs of distress of the animal terminated the experiment, and all readings slowly approached normal.

It is obvious that heating of the brain is not to a dangerous level even when amperage in excess of that used clinically is employed. Cerebrospinal pressure was markedly increased owing to the increase in the blood volume within the capillary bed. The rise of body temperature is considerable and we feel this is due to the fact that the dog's heat controlling mechanism is not very sensitive, and also because a relatively large portion of the total body area is heated.

Figure 2 represents the various recordings made on Patient 5, who had a cranial defect the result of a comminuted fracture of the skull. A thermocouple needle was introduced through the defect into the brain to a depth of 3 cm. under sterile precautions. The body temperature was recorded with mercury bulb thermometer by mouth and the surface temperature with the ordinary surface thermocouple. It will be noted that the rise of brain and body temperature is practically equal, while there is a considerable rise in surface temperature until sweating occurs. The more elaborate temperature control mechanism of the human becomes quickly active and prevents abrupt rise.

At no time during this observation did the patient complain of or show the slightest sign of discomfort.

The earliest group of patients treated were chronic hemiplegics in whom little improvement was to be expected, since their disability had lasted from several months to several years. The improvements reported were mainly subjective, such as a more comfortable feeling of the paretic extremities, lessening of the spasticity and resulting fatigue pain, improvement in speech, while in one patient of the early series epileptiform seizures were definitely reduced in frequency. Almost consistently insomnia was relieved.

In the more recent group of hemiplegics, especially in those where thrombotic lesions were supposed to exist, more rapid and definite recovery of motor power was noted than in patients not similarly treated. Where aphasia was co-existent, return of speech or ability to recognize speech appeared more rapidly. In those where involvement pointed to a small lesion, improvement was consistent and gratifying, while in others in whom a main vessel, for example the middle cerebral, seemed to be involved, no improvement of note took place.

In the case of chronic epidemic encephalitis, as in the hemiparetics, improvement was more noticeable in the more recent and less severe cases. In these patients the rigidity was usually relieved, and those unable to sew, write or play musical instruments, were able to resume these activities far more successfully.

Case Reports

CASE 1. — The following case illustrates the value of transcerebral diathermy: Miss A. L., 52 a patient of Dr. R. B. John, had complained of an increasing inability to use the right hand because of stiffness and tremor for about 15 months. The right leg was stiff and remained flexed at hip and knee so that the gait was rather grotesque. Writing was scarcely legible and could only be accomplished by assisting the guidance of pen or pencil with the left hand. While formerly she played the piano well, she could no longer use the right hand. Sewing and gardening, of which she was particularly fond, were discontinued. The change of disposition to an irritable, morose individual was inevitable. She had been receiving heat and massage and slow sine wave treatments to the involved extremities for almost a year without any result. She was encouraged to try transcerebral diathermy. After three treatments in one week she reported improvement in her sleep and felt more relaxed. Improvement was slow but steady, and after four months of consistent treatment she was again able to sew, play the piano and write letters of one or two pages legibly. She resumed her gardening activities and, although she has had no treatment for two months, maintains the improvement.

In other cases the frequency of oculogyric crises and respiratory disturbance has been markedly diminished. Rigidity has been lessened and patients previously unable to turn in bed or to dress themselves have been enabled to perform these duties. In almost all cases subjective improvement has been encouraging. In the arteriosclerotic type of paralysis agitans results were disappointing.

CASE 2. — F. S., aged 40. Right hemiplegia, 1934, including aphasia and confusion of thought. Transcerebral diathermy begun October, 1935, 3 treatments per week. Duration of treatments one hour. Out-Patient Department. After 12 treatments patient's speech was considerably improved so that he could be understood, confusion disappeared and he was able to correlate his ideas. The patient has so far received 100 treatments with a month's free interval because he complained of terrific headaches following treatments. These headaches have since not recurred. At present the patient is walking around unaided, feels perfectly well with the exception of slight spasticity of the right arm and leg. This patient came in with a blood pressure of 216/140. At present blood pressure has been running steadily about 165/90.

CASE 3. — J. L., aged 14 years. Chief complaint — trouble in walking. Since he was 3 months old the child had a peculiar complex; had a tendency to walk backwards instead of forward at the age of 18 months. The head and eyes began to gyrate. As the child began schooling, mother noticed the child was irresponsible

but could memorize poetry very easily. At age of 13 the boy began to show increased difficulty in walking; gait unsteady and moderately ataxic. Romberg was positive.

Physical examination revealed no muscular dystrophy, hesitant gait, absence of patellar and plantar reflexes, no ankle clonus, no tremors, mentally alert, no spasticity. The boy was then referred to the Neurological Clinic and the following report was rendered:

Mentally subnormal, ataxic cerebellar gait, walked with a wide base, lateral nystagmus, deep reflexes depressed, no cerebellar rebound, posture of head inclined to the left and eyes turned to the right. Diagnosis — Cerebellar type of infantile palsy, Friedreich's ataxia.

This patient was given transcerebral diathermy September, 1935; 3 treatments a week, each of one hour's duration. He has received 64 treatments with improvement in all of the above symptoms; the gait improved to nearly normal.

CASE 4. — Miss F. R., aged 20 years. Diagnosis: Chronic epidemic encephalitis with Parkinsonism. Patient complained of marked drowsiness, falls asleep very quickly, slowing up of all movements including speech, some excessive salivation. Was referred for transcerebral diathermy. Three treatments a week of one hour duration, totalling 125, gave considerable improvement in all of the above symptoms.

In a group of patients with memory disturbance, headache, rapid fatigue and vertigo and emotional instability which we felt were of arteriosclerotic origin, treatment usually gave considerable relief. This therapy was likewise applied as an adjunct in the management of a small group of cases with a parietic type of neurosyphilis, but our experience is too limited and the disease too capricious to allow any interpretation of results. In one case of essential hypertension of cerebral origin, there was a reduction of blood pressure of 30 to 40 mm., systolic and 20 to 30 diastolic during two months of treatment, with prompt return to the usual level one week after treatment was discontinued.

In none of the patients treated have any serious complications developed. An occasional superficial burn due to a technical error, and occasional headache during and after treatment, probably the result of too tight application of the electrodes, have been noted. We believe that the existence of a poor state of cardiac compensation should be considered a contraindication, as the blood vessel dilatation may lead to a degree of stasis. Because of blood vessel damage we do not deem it advisable to use transcerebral diathermy in the convulsive parietic, nor would we advise its use in apparently infected cerebral lesions.

While benefit has been fairly consistent, we have observed that improvement is proportionate to the length of the treatment rather than to the amperage of the current used. We are confident that an increase in cerebral circulation rather than brain heating is the active mechanism and consequently the longer the treatment is continued the more effective it will be. We have found that while some patients will report improvement after a few treatments, services three times a week for two to three weeks are usually necessary to produce clinical results. In many of the cases we demonstrated an increase of cerebrospinal fluid pressure during treatment. Recently we have performed preliminary spinal drainage on a few cases, and we believe that a greater circulation increase is thereby made possible.

Our attempts to record the temperature reaction of the brain to short wave diathermy were not successful as the needle quickly registered rapid temperature rises due to its own heating. The newer current was used in the treatment of some cases and is recommended for its ease of application and also because it is less disturbing to the patient, and requires shorter intervals. Our experience was confined to the use of an apparatus of six meter wave length and treatment was continued for 18 minutes, but in the final analysis the cases treated with conventional diathermy for a longer period of time gave better results.

Summary and Conclusions:

A rather large group of patients with different chronic diseases of the brain has been treated with fairly consistent improvement of subjective and objective symptoms. The method has proved to be safe and well borne by the patients.

Animal experimentation and experimental observations on one human subject show that there is no dangerous heating of brain tissue, but that the effect is probably one of reflex acceleration of circulation.

The short wave current does not seem to be as effective as conventional diathermy.

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Discussion

Dr. Richard Kovacs (New York): Both of these papers* endeavored to approach the treatment of hemiplegia on a physiologic basis and stressed the fact that there is no panacea in treatment. Dr. Bilik pointed out that it is almost futile to treat chronic cases except for keeping up their morale; his effort to treat cases at the earliest possible moment through cooperation with the other hospital departments deserves commendation. It is unfortunate that on account of the nature of his material, no definite follow-up figures are available, but it is evident that he works on sound principles and the treatment given to his patients at an early stage represent what is recognized as standard treatment according to our present day knowledge.

Regarding the experimental work with cerebral diathermy I recall a series of early cases some years ago at the Reconstruction Hospital at which I studied

the results of cerebral galvanism. My conclusion in these cases was that although there was no question that the galvanic current could pass through the skull, the beneficial effects were mainly due to a counterirritant effect. Drs. Martucci, Hadden and McGilone's observations of the mild heating of diathermy on the brain proper corroborate the conclusion that the effect of either galvanism or diathermy must be largely due to a reflex stimulation of the circulation. Cerebral diathermy treatment is safe and its rationale has been well explained. On account of the tendency towards spontaneous recovery in a large number of cases, evaluation of any treatment in the early stages of hemiplegia is somewhat difficult. For this reason employment of clinical controls, if possible, is desirable. There is no question that the treatment appears to possess definite merit and is worthy of further extended clinical trial.

* This discussion is based also on a paper by Dr. S. E. Bilik which will be published in a subsequent issue.

American Registry of Physical Therapy Technicians

Examination Monday Morning, September 20, 1937

During 16th Annual Session

American Congress of Physical Therapy

Netherland Plaza Hotel, Cincinnati, Ohio

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Write to Marion G. Smith, Registrar
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EDITORIALS

FRACTURES AND PHYSICAL THERAPY

The circumstance that in spite of exhaustive monographs and general works the literature periodically brings new suggestions for the care of fractures, is proof that the results obtained are not altogether satisfactory. So far as the methods of surgical treatment are concerned it is doubtful whether they can be improved upon, since under fairly normal conditions the triad reduction, immobilization and extension represents the very best thought, and with the facilities for exact control by roentgenography gross technical errors should be avoidable in virtually every instance.

Unsatisfactory results are most often due to improper management after the first and definite manipulation. It is not an uncommon experience to see patients immobilized in bed, with the surgeon marking time until the formation of callus justifies removal of the cast. Now it is the patient who finds fault because he is struck with the fact that articular and muscular function is sufficiently impaired to prevent him from resuming his usual occupation, if this involves physical labor.

In seeking the underlying cause or causes for such a situation, which is more widespread than is commonly believed, one is constrained to challenge the claim that modern physicians and surgeons have begun to regard pathology in terms of altered physiology. Physiology must be the basis of every form of therapy, and physical therapy is the most important prop for restoration of physiologic function. It is therefore regrettable that even in standard monographs on fractures the subject of physical therapy is swished over in a page or two while hundreds are devoted to orthopedic and operative surgery.

Such a stepmotherly allotment necessarily leads to the impression, especially among neophytes, that the cast is everything and the rest merely a formality. If teachers and text writers have fully grasped the significance of physiologic thinking, then it is their duty to do more than mention such measures as massage,

exercise, heat and the like. What is the young graduate with the best of intentions to become a scientific practitioner to do with these agencies? He knows that massage is a procedure resembling rubbing the body, he knows the definition of exercise, and he even appreciates that externally applied heat is good for some painful conditions, but here his fund of knowledge is at an end. With a patient in a cast, he reaches the conclusion that even though he has been informed that these measures are valuable, he simply cannot apply them until the cast is taken off. Here lies the crux of the problem. As long as teachers and authors do not care to go to the trouble of giving the scientific basis for the employment of physical measures in the management of fractures in general and of special fractures in particular, that long will there be unnecessarily prolonged hospitalization and subsequent disability.

In large institutions with trained technicians and a qualified specialist in physical therapy to direct their work, the surgeon will comply with all that is necessary if he will call for the facilities offered by the physical therapy department in due time. What he may lack in knowledge of methods will be equalized by expert cooperation. But the general practitioner, who perchance must build up a reputation in a small town devoid of large city facilities, is thrown on his own resources. It is he who must be his own masseur, and it will indeed be useful practice for him for a future eventuality when he will be in a position to be consultant. He must know not only the how but also the when and where. The same holds good for assisted active movements. When are they to be started, how are they to be carried out both in technic and intensity, and when is the patient to carry out active movements without assistance? These are questions few young physicians can answer correctly. We recall an instance where an interne in a well regulated hospital even stopped assisted movements because the patient complained of slight pain. He interpreted that as a contraindication until he was given proper advice.

Short wave diathermy will undoubtedly revolutionize the management of fractures, for obvious reasons. How much of it is taught senior medical students? We fear very little in many of our medical schools. Yet every physician has a chance not only to be of great help to a fracture sufferer but to earn his appreciation by this agency, the application of which needs only to be pointed out to a novice to insure its proper use.

THE AMERICAN MEDICAL ASSOCIATION AND PHYSICAL THERAPY

At this year's meeting of the American Medical Association, held in Atlantic City, the Council on Medical Education and Hospitals, represented by its distinguished secretary, Dr. William D. Cutter, presented an extensive report, part of which should prove of vital interest to all physicians who are earnestly interested in the scientific advancement of physical therapy.

In a few terse sentences Dr. Cutter made the statement that few medical schools are giving adequate attention to instruction of physical therapy. And what greater tribute to the importance of this discipline can there be than his authoritative pronouncement that "great benefits ** may be derived from this form of treatment ***." Dr. Cutter went even further by insisting that "every physician should be familiar with the indications for physical therapy and with the results which may be attained by its use."

This report redounds to the credit of our great national body. Its wholehearted support of physical therapy thus frankly and freely expressed officially at one of the executive sessions, can only spur the membership of the Congress to still further efforts in the scientific development of our special field. There

is nothing we can say that will add to the weight of the call by the American Medical Association for all medical faculties in our land to stress physical therapy as an important part of their curricula.

The editorial on fractures and physical therapy published in this issue was drafted a short time before the proceedings at Atlantic City became known. It shows the importance of proper undergraduate instruction in physical therapy in relation to a comparatively small part of the work done by surgeons and general practitioners. What has been said in relation to fractures applies with equal force to many other diseases, injuries and pathologic processes in which experimental and clinical experience has shown physical procedures to be of decided therapeutic value. Not only the Congress but the entire medical profession should be and doubtless is deeply indebted to the American Medical Association for the step it has taken, for it certainly will prove a marker in the history of American medicine that will point to a better and greater future in therapy.

CINCINNATI AS A CONVENTION CITY HOST TO THE 16TH ANNUAL SESSION—SEPTEMBER 20 TO 24

As the Congress continues to grow in membership and to expand its diverse activities, the selection of a place for each annual meeting is a problem of great importance. In deciding for the next annual session on the city of Cincinnati the committee in charge has exercised excellent discernment. Cincinnati is not only physically well fitted for scientific conventions of magnitude, but important medical groups in that city are wholeheartedly cooperating with the Congress to render the next session one of the largest and best in the cause of Physical Medicine.

The Netherland Plaza Hotel, which will house the Congress during its manifold deliberations and provide suitable space for the scientific and technical exhibits, is peculiarly suitable for the coming event. There is ample space for the headquarters, general and special sessions, and the other scientific and administrative functions as well as for the adequate display of all types of exhibits. This hotel, which ranks as one of the finest in the country, offers excellent accommodations to our members, their families and friends at very reasonable rates.

It hardly needs pointing out that the central location of Cincinnati will prove easily accessible to residents of towns within a large radius, nevertheless those physicians interested in the advances of physical therapy who happen to live at a considerable distance can ill afford to miss attending the next convention, because the program and exhibits this year will prove exceptionally informative.

The preliminary program will be published in the August issue of the ARCHIVES. Here it must suffice to call attention to the fact that several outstanding authorities in the field of physical medicine and allied sciences are coming from Europe to contribute their research to the scientific part of the program. We need only mention the names of Pätzold and Gunsberg to indicate the character of the material that the committee has secured. Others of equal authority have pledged their attendance and have promised to send abstracts across the ocean in time for the final announcement.

In addition to the honored guest-speakers, the convention will have an opportunity of hearing an address by Harry E. Mock, Chairman of the Council on Physical Therapy of the American Medical Association. Dr. Mock is an outstanding example of the modern conservative surgeon who appreciates the value of physical therapeutic measures in his specialty. His address will be delivered at the special joint evening session with the Academy of Medicine of Cincinnati.

An idea of the scope of this year's program can be had from the statement that symposia will be presented on fractures, fever therapy and short wave dia-

thermy. It is hardly necessary to stress the fact that every effort has been made to secure the best qualified men to lead in the discussions. Experimental data will be submitted for the proper evaluation of a number of important procedures in medicine and surgery. Virtually every specialty will be adequately represented both in the scientific program and in the exhibits. The committee has fully appreciated the urgent need of a balanced program with reference to the diverse specialties, as is evidenced by the provision for such widely separate topics as electroresection of the prostate, electrosurgical management of cervicitis, physical therapy of poliomyelitis, arthritis and vascular disease, to which should be added iontophoresis, phototherapy, kinetotherapy, hydrotherapy and others. The committee is in the happy position to announce that these topics will be presented from new viewpoints.

As in former conventions there will be held seminars Tuesday and Wednesday forenoon (September 21 and 22) for small specially interested groups. These group meetings will be entirely separate from the rest of the general program.

The convention will be formally opened Monday evening (September 20) with the Mayor of Cincinnati, the President of the Academy of Medicine and the Dean of the University of Cincinnati participating in the exercises. On that evening the customary scientific oration will be delivered by Dr. Melvin S. Henderson, of the Mayo Clinic.

Thursday (September 23) evening will be devoted to an interesting educational conference, at which time will be heard also a detailed report on the work accomplished by the American Registry of Physical Therapy Technicians. The sole social function will be the annual Congress dinner, which will be given Wednesday evening. At that function there will be in addition to entertainment an opportunity to hear informal messages from prominent representatives of our profession.

Preparations have been made for a large gathering. Physicians are urged to make early preparation to attend. Cincinnati and vicinity offer not only much that is worth seeing but the climate at this season is usually ideal, providing an excellent opportunity for a vacation for one's family. Again we urge our readers to scan the announcement of the preliminary program in the next issue and to make hotel reservations without delay.

NEW MEMBERS

The Congress is especially desirous of increasing its membership roll before the 16th annual session. While many new applications for membership have been received throughout the year, the hope is expressed that many more will be added by September. Membership applications are acted upon only at the annual business meeting, making this the opportune time to secure a new application for acceptance at the forthcoming meeting in Cincinnati. More and more physicians are constantly becoming interested in physical therapy. If you will apprise them of the activities of the Congress, it will be a simple matter to affiliate them with the organization which can do the most for them in this field. Secure a new application today. If you need application blanks write to the Executive Secretary, American Congress of Physical Therapy, 30 North Michigan Avenue, Chicago.

SCIENCE, NEWS, COMMENTS

Hospital Medical Library Suggestions — Prepared by the Council on Medical Education and Hospitals of the American Medical Association

The "Essentials in a Hospital Approved for Training Interns" contains the following provision:

"There must be a working medical library, in charge of a librarian, which should contain a useful selection of late editions of standard text and reference books and current files of not less than ten of the better medical journals. The library should be inside the hospital building and be located where it is readily accessible to the interns and staff members. Collections of choice reference books, in pathology and clinical diagnosis and in roentgen-ray work should be found respectively in the pathologic and roentgenologic departments."

Included in the "Essentials in a Hospital Approved for Residencies in Specialties" is the following medical library requirement:

"The hospital shall maintain, or provide ready access to, an adequate medical library containing modern texts and current journals covering the fields in which residencies are offered."

Since the internship must now be considered as the fifth year in medicine and approved residencies in specialties as postgraduate work, hospitals on such educational bases should provide adequate medical libraries.

While it is impossible for all hospitals to be possessed of an ideal library such as may be found in a medical school and in some of the large teaching hospitals, there are few hospitals that cannot maintain a library of a few choice medical periodicals, standard texts and reference books.

The important function of a medical library in a hospital is to provide attending physicians and interns with material for immediate reference and consultation, intensive study of the patients in the hospital, and the preparation of papers, discourses and special reports to be used in staff meetings, medical gatherings and for publication.

Physical Therapy

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Meetings of Physical Therapy Organizations

In this permanent column will be published information about meetings, election of officers, etc., of physical therapy organizations. New data should be sent promptly to the office of the Secretary, 1100 Park Avenue, New York.

American Congress of Physical Therapy; Cincinnati, September 20th to 24th; Dr. Richard Kovács, 1100 Park Avenue, New York, Secretary.

Academy of Physical Medicine. Annual Session, Hotel Walton, Philadelphia, October 19, 20, 21. Herman A. Osgood, M.D., Secretary, 144 Commonwealth Avenue, Boston.

Pacific Physical Therapy Association; meetings at Hollywood Hospital, Hollywood, Calif. Cora Smith King, M.D., Secretary, Hollywood Hospital.

Kings County Medical Society, Physical Therapy Section; meetings at 1313 Bedford Avenue, Brooklyn, bi-monthly on second Thursdays; Dr. H. T. Zankel, 5 St. Paul's Place, Brooklyn, Secretary.

Pennsylvania Physical Therapy Association; meetings at the Philadelphia County Medical Society Building, third Thursdays from September to June; Dr. Arno L. Zack, 216 East Broad Street, Bethlehem, Pa., Secretary.

New England Physical Therapy Society; meetings at Boston on second Wednesdays from October to June; Dr. William McFee, 41 Bay State Road, Boston, Mass., Secretary.

New York Physical Therapy Society; meetings at the New York Academy of Medicine, on first Wednesdays from October to May; Dr. Madge C. L. McGuinness, 1211 Madison Avenue, New York, Secretary.

Scattering X-Rays Tell of Dust Danger

X-rays, scattering upon striking atmospheric dust, warn of the deadly particles of free silica that make certain industrial jobs extra-hazardous.

How this new task has been added to the long list of beneficent works performed by the invisible penetrating rays, was related by Prof. G. L. Clark and D. H. Reynolds of the University of Illinois, before the meeting of the American Chemical Society at San Francisco.

Other dusts make the air thick and produce discomfort, but the real peril to workmen comes from free or uncombined silica. Methods hitherto in use by public health investigators have been difficult and sometimes not dependable.

X-ray scattering or diffraction, however, is claimed by its discoverers to be both more rapid and more sure than any hitherto employed. The method depends on the fact that when a thin beam of x-rays strikes any substance it is diffracted or scattered, and that each substance has its own characteristic "diffraction pattern." The pattern produced by x-rays passing through a mass of silica particles, for instance, cannot be duplicated by any other substance. — *Science News Letter*.

Surgical Operation on Nerve for Severe Diabetes Reported

A surgical operation to relieve severe diabetes was reported by Drs. Fred A. Hitchcock and George M. Curtis, of Ohio State University, at the meeting of the American Physiological Society.

The patient, one of the first to undergo this operation, which has only recently been developed through animal studies, was a young lad suffering from very severe diabetes. To control the condition he had to take one hundred units of insulin a day. This is a large dose and the cost of the treatment had become excessive for this patient. His physician had read reports of the operation performed on diabetic dogs and asked the Ohio investigators if they could not use the same surgical method to help his patient.

Arrangements were made whereby the patient became a "research project"—a human guinea pig—who let the scientists make important studies on him in return for the benefit he derived from the operation. This consisted in cutting the splanchnic nerves in the back of the chest. Following the operation the patient was able to get along on about half the amount of insulin he had been taking. — *Science News Letter*.

New Theory Explains Light Electric Rings of Force

A new theory explaining the long-baffling problem of the apparent dual nature of light which sometimes acts like a particle and at others like a wave motion has just been reported by Sir Joseph Thomson.

Elderly Sir Joseph, who is known the world over as J. J. Thomson, was elected Fellow of the Royal Society as far back as 1884 and is now head master of Trinity College, Cambridge University. He was awarded the Nobel Prize in physics in 1906.

A photon of light, according to the distinguished scientist, might well be regarded as a ring of electric force traveling at right angles to its plane. It would be like a ring slipping along a cane; the cane serving as the light ray. Sir Joseph now extends this picture of light to consider a photon of light as a series, or train, of such rings.

A quantum of light, he suggests further, would be a train of definite length of these electric rings of force that would be given out by an electron in falling between energy levels in an atom. A train of rings, Sir Joseph indicates, would make possible an explanation of the interference of light. — *Science News Letter*.

Smoking Dulls Taste for Salts and Sweets

If you reach for a smoke, you will not be able to taste your sweet very well. Smoking tobacco dulls the acuteness of taste for both sugar and salt, it has been found in experiments conducted at Catholic University of America, by Dr. John E. Rauth and James J. Sinnott. But the effect is not permanent; when the smoking is stopped, the ability to taste returns to normal.

Six habitual smokers who planned to give up smoking for a period volunteered as subjects in the experiment. Tests were used to determine the weakest solution of sugar and of salt that could be tasted by each one. Then they stopped smoking. Their taste became more acute, so that they could taste solutions of sugar only about half as strong as their former limit. Salt could be tasted in solutions about two-thirds as strong as formerly.

The test is keen. Two of the individuals sneaked in a couple of smokes during the non-smoking period. Their taste for sugar betrayed them.

Non-smokers tested as a check on the experiment were very much like the smokers during their non-smoking period. — *Science News Letter*

THE STUDENT'S LIBRARY

ORTHOPAEDIC SURGERY. By *Alfred Rices Shands, Jr.*, B.A., M.D., Associate Professor of Surgery in Charge of Orthopaedic Surgery, Duke University School of Medicine, and Chief of Orthopaedic Service, Duke Hospital, Durham, N. C., etc. In collaboration with *Richard Beverly Raney*, B.A., M.D., Instructor in Orthopaedic Surgery, Duke University School of Medicine. Cloth. Price, \$5.00. Pp. 593 with 169 illustrations. St. Louis: The C. V. Mosby Co., 1937.

The close relationship between orthopedics and physical therapy is one of the reasons why the present volume should prove a welcome addition to the reading table. Another valid reason is because the author has taken especial pains to prepare a handy volume to suit the needs of general practitioners. In addition he has arranged a clinical survey of the present-day status of orthopedic surgery in the light of modern progress in this special field made throughout the civilized world. The text is divided in no less than 24 chapters embracing the entire gamut of diseases, deformities and injuries commonly accepted as falling within the domain of orthopedic surgery, both mechanical and operative. Of especial interest are the chapters devoted to the diverse types of arthritis, which are grouped to avoid the widespread confusion about their clinical classification, to the neuromuscular disabilities, to fracture deformities and to the affections of the various articulations. A chapter on body mechanics and physical therapy is highly informative and properly condensed to accepted facts. This chapter also shows the proper evaluation of physical therapy as an adjunct to other methods of corrective therapy. The illustrations are exceedingly clear, many of them sufficient in themselves so as to render the descriptive text almost superfluous. A bibliography of no less than 57 pages will prove of great value to students of the concerned literature. From a clinical point of view the present volume is one of the simplest and most reliable contributions to American orthopedic surgery.

ELECTROKINETIC PHENOMENA AND THEIR APPLICATION TO BIOLOGY AND MEDICINE. By *Harold A. Abramson*, M.D. (American Chemical Society Monograph Series.) Pp. 331. Cloth. Price, \$7.50. New York: The Chemical Catalogue Company, 1934.

On rare occasions a work of first importance comes ushered in under a cloak of such modest publicity that it remains a neglected contribution until accidental rediscovery forcibly points out its great merit. This situation well describes the status of this excellent and scholarly monograph on a subject of special interest to students of physical therapy. It is a work that critically reviews the fun-

damental data regarding the influence of electric phenomena in active motion and its effect on biologic and medical problems. Published at a time when the clinical value of iontophoresis just began to demonstrate its scientific status in therapy, it was but natural that such a work would be received with enthusiasm and indifference. While it was promptly acclaimed by physical chemists and laboratoricians as one of the most scholarly contributions on the subject of electrokinetic phenomena, its study by the medical profession was materially neglected due to the fact that the author often utilized a style of exposition (formulas and the like) too technical for average appreciation. It should be pointed out, however, that while the intellectual "digging" may at times be considered laborious, the richness of this soil will be found of such practical value to students of physical medicine that its perusal is highly to be recommended. The volume contains a great deal of basic information on the "whys and wherefores" of iontophoresis. Within the limit of eleven chapters, Abramson presents an extensive historic review of the growth of electrochemistry; the discovery of electroosmosis; the introduction and interpretation of such terms as iontophoresis, cataphoresis, and the like; and a description of the outstanding pioneers and their contributions. The exposition is so diversified as to take the reader through many theoretic and practical discussions on electrophoretic action on gases and liquids, through various methods of observing this phenomena in action on inorganic salts and protein material, blood cells, tissues, bacteria, and related topics. While this work of necessity deals with problems that are at times rather technical for medical practitioners, it is nevertheless one of the important contributions on the fundamentals of electrokinetic phenomena, providing the student the most authoritative and comprehensive explanation of the nature and action of iontophoresis in therapy.

ERGEBNISSE DER MEDIZINISCHEN STRAHLENFORSCHUNG Röntgendiagnostik, Röntgen-, Radium- und Lichttherapie. Edited by *H. Holfelder*, Frankfurt a. M.; *H. Holthausen*, Hamburg; *O. Jüngling*, Flensburg; *H. Martins*, Göttingen; *H. R. Schinz*, Zurich. Band VII. Paper. Pp. 622, with 294 illustrations. Price, 67.50 and 69.50 R.M. Leipzig: Georg Thieme, 1936.

This is the seventh volume of a work initiated in 1925 and presented under such extraordinary scholarship and editorial supervision that one finds it difficult to review its contents without the warmest felicitation to all the authors for their splendid contributions. The volume represents a cross-section of the most authoritative information on twelve distinct and important clinical entities in which roent-

gen and radium therapy plays an important role. Everyone of the twelve topics under discussion represents a special division of this voluminous contribution, each being so inclusive and detailed as to be considered a valuable monograph in itself. Indeed, each division contains its separate table of contents and an exhaustive bibliography, with illustrations so clear and profuse as to give greater literary coherence and independence to its exposition. The work incorporates discussions of such widely separated subjects as the diagnosis and treatment of lipogranulomatosis; Albers-Schönberg or marble bone disease; progressive myositis ossificans; atelectasia of the lungs; irradiation of female genital tuberculosis; treatment of carcinoma of the esophagus; irradiation therapy of mammary carcinoma, and others. For those who can read German, this book should be in their possession as an indispensable addition to their library.

EXERCISE AND HEALTH. By *Jesse Feiring Williams, A.B., M.D.*, Professor of Physical Education, Teachers College, Columbia University. National Health Series. Edited by the National Health Council. Cloth. Pp. 70. Price, 35 cents. New York: Funk and Wagnells Co., 1937.

This small monograph on exercise is interesting to both physician and patient. The author's philosophy of exercise is extremely interesting. He believes that the fullness of function is not to be maintained by activities that are vastly different from those that man has used through countless generations. Setting up exercises are very poor forms in relation to the sort of thing that man has done. Walking is an exercise vastly superior to calisthenics for the same reason. He believes that artificial exercises deserve very little place in the life of modern man except to correct particular defects. Perusal of this booklet will repay every one interested in the problem of systematic exercise.

THE COMMON COLD. By *Wilson G. Smilie, A. B., M.D., Dr. P.H.*, Professor of Public Health Administration, Harvard School of Public Health National Health Series. Edited by National Health Council. Cloth. Pp. 77. Price, 35 cents. New York: Funk and Wagnells Co., 1937.

This popular booklet gives lay readers helpful and authoritative information on the common cold. There are interesting chapters on the prevalence, cause, treatment, prevention and complications of colds.

The text, which is as terse as it is brief and lucid will prove of especial interest to laymen who desire to know the medical aspects of what is commonly referred to as head colds.

THE RIDDLE OF WOMAN. A Study of the Social Psychology of Sex. By *Dr. Joseph Tenenbaum.* Cloth. Price, \$3.50. Pp. 477. New York: Lee Furmann, Inc., 1936.

After reading this volume one wonders if the

riddle of woman was solved by Thomas Browne some three hundred years ago when he wrote:

The whole world was made for man, but the twelfth part of man for woman; Man is the whole World, and the Breath of God; Woman the Rib and crooked piece of man. I could be content that we might procreate like trees without conjunction, or that there were any way to perpetuate the World without this trivial union. . . .

The author, a man, certainly undertook a large task in his study of the sex psychology of woman as a whole, wife, bride, unmarried wife, adulteress, divorced wife, widow, virgin, spinster and beauty. The book does not solve the "riddle of woman," but is recommended as interesting reading.

WILLIAM ALLEN PUSEY AT CLOSE RANGE. By *Herbert Rattner, M.D.* Cloth. Pp. 50, with illustrations. Reprinted from the *Archives of Dermatology and Syphilology* January, 1937. (Special number in his honor.) Chicago: American Medical Association, 1937.

It is generally agreed that books, like humans, have their special personality. Some are accepted at face value, others have the most difficult of tasks to capture more than the initial attention of a reader. The reason for this is simple to understand and not so difficult to explain. Some have the magic quality to open minds and hearts, others like astringents pucker the sympathetic pores of our intellect because of an innate distaste for the subject or the manner in which it is presented. The brochure under consideration is easy to the eye and a delight to the heart. The author, a disciple and associate of the personality he so nobly reviews, shows in these altogether too few pages a talent for biographic exposition suggestive of important future development. He is in possession of a style that is facile, flexible and sympathetic, painting a picture of a great physician, educator and humanitarian that fills the heart with the inspiration of deeds accomplished. In simple word and sentence structure Rattner describes the professional career of William Allen Pusey, regarded in the dermatologic field as much the classicist as was Osler in his, a man now in the mellow seventies who like Prospero in *The Tempest* has attempted to relinquish worldly cares for a life of contemplation, philosophy and travel. The author is to be highly commended for contributing to our literature such a sympathetic and inspirational picture of one of the contemporary master physicians of America. Pusey's "twelve points" of the profession's principles and policies in its public relationship are quoted in this book and should be memorized by every graduating student of medicine. It lays down in terse fashion the principles of practice, the responsibilities of medical service, and the rights of the medical profession. It is predicted that this short biography of Pusey will set the style for similar contributions and will grow in demand with passing time. One realizes from the appended list of offices and memberships held by Dr. Pusey including that of presidency of the American Medical Association, the titles of his nine books, and 112 articles, that talent and industry bring their special rewards. This book is worth reading and re-reading.

INTERNATIONAL ABSTRACTS

Clinical Evaluation of Short Wave Diathermy in Otolaryngology. A. R. Hollender.

Medical Rec. 145:376 (May 5) 1937.

By diathermy we are enabled to produce heat at levels considerably below that of the subcutis. Conventional diathermy, however, has certain limitations and disadvantages which soon might prove of purely historic interest. This is because with the type of higher frequencies known today as short wave diathermy most of the limitations and disadvantages incident to conventional diathermy have been overcome. The effect of heat on inflammation is discussed and the experimental work of several investigators as well as that of the author himself reviewed. The subject of apparatus is presented and detailed from the standpoint of source and method of application of the energy. The technic of applying short wave diathermy to the sinuses, pharynx, larynx and ear is described and illustrated.

In his comment, the author states:

"It may not be amiss to point out that when short wave diathermy was introduced to the medical profession a few years ago, the erroneous impression gained ground that this agent possesses mysterious biological effects apart from its thermogenetic property and that the technic of its application is simple mechanically and devoid of hazards. As a matter of fact research has to date failed in demonstrating biological properties other than those ascribable to the known local and constitutional effects of heat. It is true that certain changes in the human economy following the application of short wave diathermy are strongly suggestive of certain specific influences but absolute data in their support are yet to be established.

Technically, too, every practitioner should be thoroughly familiar with many details not only concerning dosage and method of application, but avoidance of undesirable reactions, not excepting superficial burns. Precautions such as the removal of metals from the field of treatment, the proper spacing of electrodes, the special attention to dosage in the case of patients suffering from diminished or abolished sensation of heat, are the principal ones to be carefully observed. Under such circumstances short wave diathermy will prove one of the most effective therapeutic aids in a large number of otolaryngological conditions."

The author summarizes as follows:

1. Heat has for a long time been used empirically in otolaryngology for the alleviation of pain, but its influence on underlying inflammatory process is now recognized.

2. The limitations and disadvantages of conventional diathermy, especially in otolaryngology,

have largely been overcome by short wave diathermy.

3. The results of several workers on the relation of clinical effects to experimental temperature determinations, especially in the sinuses, are reviewed.

4. For otolaryngological purposes special electrodes are required but any apparatus of adequate wattage utilized in general medicine is suitable.

5. Clinically short wave diathermy is a valuable adjunct in the treatment of nasal sinusitis but insufficiently effective in itself to replace classic therapeutic procedures.

6. Short wave diathermy is of value in promptly relieving the pain of acute tonsillitis, pharyngitis and laryngitis and in shortening their course when combined with indicated constitutional measures.

7. In otology short wave diathermy is an effective remedy for auricular infections, otalgia, acute myringitis and eustachian catarrh, but is of doubtful value in chronic pathological processes.

8. Every practitioner should be thoroughly familiar with dosage and method of application, and avoidance of undesirable reactions.

Injuries From Electricity and Lightning. MacDonald Critchley.

Brit. M. J. 3911:1217 (Dec. 21) 1935.

Treatment of electrical and lightning accidents is divisible into the following steps: (1) liberation of the victim from the circuit; (2) emergency treatment for shock and "apparent death"; (3) treatment of the unconsciousness; (4) treatment of the burns, fractures, and tissue necrosis; and (5) management of complications.

Removal of the victim from the live installation is the first duty. The patient may be lying unconscious with some part of the body still in contact with the current-bearing wire or terminal. Or the victim may be conscious but unable to release himself from the live wire.

As soon as he is released, artificial respiration should be begun if he is unconscious or apparently dead. This should be instituted before a physician is called and if only one person is present he should start artificial respiration without delay and continue until patient either recovers or is pronounced dead. Either the Schaefer or the Sylvester method can be employed. Above all, it is necessary to avoid panic and to act coolly. Jellinek once contrasted seven patients with injury from low tension current, five of whom died, with eight patients who had sustained grave injury from high tension currents and all of whom recovered. In the former group the emergency treatment was inadequate; the bystanders hesitated as to what should be done and

neglected to institute artificial respiration. Even such an obvious act as to switch off the current was forgotten. The outcome of clinical and experimental evidence is that artificial respiration is the most effective means of resuscitation. Other measures, such as inhalation of O_2 and CO_2 , the use of the pulmotor, are on the whole less effective.

Posture and Diuresis in Treatment of Renal Calculi. R. Ogier Ward.

Lancet 232:23 (Jan. 2) 1937.

For a good many years Ward has been in the habit of encouraging patients, upon whom he operated for renal calculi, to do more than merely maintain intense diuresis. He has given them exercises in posture to carry out combined with a definite water intake. The instructions have been as follows:

One day out of each week on waking, drink one-third of a litre bottle of Evian, Contrexeville, Vichy, Vittel, or other water, then adopt the following postures, spending five minutes in each: (1) Lying flat on the back with only one pillow under the head. (2) Lying flat on the face. (3) Lying on the right side. (4) Lying on the left side. (5) Kneeling with the knees drawn up to make the thighs vertical while the trunk is bent downward onto the bed, so that you are resting on the upper part of your chest, the head being turned to one side. By this means the body is turned half upside down.

Investigation of Absorption of Ultraviolet Light by Cerebrospinal Fluid in Various Disease States. E. Fretson Skinner.

J. Neurol. and Psychopath. 17:213 (Jan.) 1937.

Normal cerebrospinal fluid has a definite absorption spectrum with a band of absorption between 2600 and 3200, which gives a humped curve on a graph. In cases of infection of the meninges, whether acute or chronic, the normal curve is shifted toward the long wave end of the spectrum. There appear grounds for believing that the hump in the normal curve may be due to uric acid and that the shift to the right in inflammatory conditions is possibly due to an increase in this constituent. Certain observations seem to suggest that in some cases coma may be due to the direct action of uric acid on neurons. Removal of electrolytes diminishes absorption and shifts the curve to the left, giving a horizontal-seeking curve. Removal of protein has the opposite effect, giving increased absorption and a shift of the curve to the right. There is some slight evidence that the method of ultraviolet spectroscopy might be of use in identifying substances excreted in body fluids.

Some Observations in Radium Treatment of Cancer of Tongue. V. McDowall.

M. J. Australia 2:218 (Aug. 15) 1936.

McDowall has been treating cancer of the tongue since 1928 with interstitial application of radium. Although his figures are small, he

finds on comparing them with those of other workers who have larger numbers to deal with that there is not a great deal of difference in the average results. Of his patients treated in 1929, approximately 33 per cent are now alive and apparently cured. The greater number of the 33 per cent of cured patients come from what he considers to be the favorable group, that is, those with no palpable glandular involvement at the beginning of treatment. Of the patients in whom there were palpable glands at the time of treatment, only two now survive, and he is of the opinion that the result in these two cases was due more to other causes than to the method of treatment. In most of the patients with glandular involvement who received radiation treatment there was some improvement. This amounted in a few instances to a temporary disappearance of the glands and in others to a shrinkage or regression of the glands. In the majority even of the unfavorable cases there has been at first considerable diminution of pain. Subsequent treatments to the glandular growths were never so effective as the first. In the majority of cases in which there was secondary glandular involvement the period of survival ranged from a few weeks to eighteen months, although the average survival time was from seven to eight months. — *Abst. J. A. M. A.* 107: 1762 (Nov. 21) 1936.

Surgical Treatment of Retinal Detachment. Sanford R. Gifford.

Arch. Ophthalm. 16:405 (Sept.) 1936.

The Safar method with Walker's pins has been employed exclusively for the past three years, and a review of this material may serve to bring out some point of practical interest. Of the 33 eyes reported on, 6 required a second operation, which was successful in only two cases. In several other cases a second operation was advised with some prospect of success but was refused. Results in this relatively small series, while not as good as those reported by Weve and Safar, agree fairly well with those in most other series, such as those of Veil and Dollfus, Knapp, Walker, and Dunnington and Macnie. They indicate what results should be in an average series. They can probably be improved by increased experience and especially by an increase in the general knowledge that detachment is a surgical condition and should be operated on at the earliest possible moment.

Review of Urologic Surgery. Albert J. Scholl; E. Starr Judd; Jean Verbrugge; Alexander B. Hepler; Robert Cutierrez, and Vincent J. O'Connor.

Arch. Surg. 32:544 (March) 1936.

The rapid rate at which highly inflammable gases may be evolved during the use of high frequency currents for transurethral resection emphasizes the necessity of caution in order to prevent the occurrence of serious accidents. Since a small volume of

gas mixed with air is sufficient to produce a violent explosion, simple lavage after each series of cuts cannot be considered an adequate safeguard unless the entrance of air is rigidly prevented. The diverse character of the gases in the mixture precludes the possibility of their removal by an absorbent. If a large amount of air or gas collects in the bladder, as shown by a large bubble, this should be aspirated by inserting a ureteral catheter into the bubble, before cutting or coagulating is done. When the patient is placed in the Trendelenburg position, the bubble is brought closer to the area to be coagulated and the danger of explosion is increased, as explosion does not occur unless the arc comes in contact with the gas.

Hyperthermic Treatment for Acute Gonorrheal Ophthalmia. Forrest J. Pinkerton.

Am. J. Ophthalm. 20:63 (Jan.) 1937.

Pinkerton reports a case of acute gonorrheal ophthalmia treated with excessive high fever with favorable response. A male Filipino presented himself with evidence of specific urethritis and left eye involvement. The right eye in spite of efforts to protect it also became infected within 24 hours after hospitalization. The patient received his first treatment initiated at 7:00 A.M. the morning following admission. Within a period of two hours the temperature rose from 99 F. to 107.5 F. which was maintained until 3:30 that afternoon. Following this he was allowed to cool off gradually and removed from the cabinet at 5:00 P.M. He received 4,300 cc. of fluid during his treatment in the cabinet. He was restless and irrational during treatment. His blood pressure fell from 130/80 to 90/50. The eyes were markedly improved, the discharge definitely diminished. The succeeding treatment was maintained under difficulty, the patient becoming irrational and violent. The treatment was interrupted and the patient kept in the hospital for 37 days during which period he made a satisfactory recovery, that is, no discharge from either eye.

Sterilization of Air in Operating Room by Special Bactericidal Radiant Energy. Deryl Hart.

J. Thoracic Surg. 6:45 (Oct.) 1936.

In the present stage of surgery Hart believes that pathogenic bacteria given off by human beings and floating in the air cause the major portion of infected wounds originating in the operating room. Accordingly the author has used special lamps for bactericidal radiation to eliminate this hazard of infection. He believes that the number of infected wounds is still high (10 per cent to 20 per cent) as indicated by reports from certain clinics in which a careful survey has been made and accurate records have been kept. The majority of these are so mild that the profession and public have not become aroused. Hart asserts that these can be greatly reduced by bactericidal radiation and that soon the public will no longer consider the infection beyond the control of the surgeon. Sterilization of the air by ultraviolet irradiation permits him to operate

on clean cases without great fear of infection, whereas formerly the dread of bacterial contamination from an uncontrollable source was ever present.

Diathermic Coagulation in Chronic Cervicitis. R. G. Herrera, and A. E. Nogués.

Semana Méd. 44:107 (Jan. 14) 1937.

Herrera and Nogués point out possible complications of diathermic coagulation in chronic cervicitis. The most serious complications may be immediate or late hemorrhages, pelvic inflammation, obturation of the external orifice of the neck of the uterus by membrane formation, and cicatricial stenosis of the cervical canal. The latter may result in the formation of hematomata, hematosalpinx and hematocele as the result of retention of menstrual blood and, later on, of pyometra, pyosalpinx and peritonitis by complications or infections. The authors report several cases of complications and advise, first, limitation of electrocoagulation to proper indications and even then at the hands of specialists and not general practitioners. *Abstr. J. A. M. A.* 108:851 (March 6) 1937.

Effect of Short Wave Current on Temperature of Paranasal Sinuses. Harry Rosenwasser, and William Bierman.

Arch. Otolaryngn. 25:555 (May) 1937.

The technic consisted in the use of a condenser electrode cut out in the shape of a butterfly so as to cover the region of the frontal sinuses, nose and maxillary antrums and another condenser electrode applied to the upper part of the back or else placed on a wooden chair, the patient sitting on it. A solid oblong condenser electrode was also placed over the area of the forehead, nose, eyes and cheeks. These electrodes were separated from the skin by felt pads and towels. The machines used produced oscillations of 50,000,000, 20,000,000 and 18,750,000 cycles (wavelengths of 6, 15 and 16 meters, respectively). Within the range of these frequencies no decided variation in the heating effect of the different machines was noted.

A special thermocouple was used to determine values for temperature. This thermocouple was long, thin and flexible, with an iron constantan junction. It had been calibrated so that when attached to the registering instrument it showed accurate readings. The thermocouple was checked frequently against a mercury thermometer in a water bath.

Measurements of temperature were made with and without the use of local analgesia. A solution containing cocaine hydrochloride (10 per cent) and epinephrine hydrochloride (1:1,000) had a decided influence on the changes in temperature. After the use of this mixture as a spray the values obtained became lower.

The application of short wave current was followed by a rise in temperature in nearly all instances; (it fell from 0.5 to 1 degree F. in two determinations and remained the same in four

others). The amount of elevation varied from 0.6 to 4.5 degrees F. The average rise was 1.31 degree F. The greatest rise in temperature was observed in those cases in which the temperature before the treatment was relatively low. Conversely, the smallest rise occurred in those cases in which the initial temperature was relatively high. This was noted in the cases in which operation was more recent. Truer values would probably have been obtained if the temperatures in the sphenoid sinuses of the patients who had not had any surgical intervention had been determined. As Andreen and Osborne stated: "In cases in which an exenteration or a window resection had been done, the sinus merely becomes a part of the nasal cavity, and any heat which may be generated is dissipated much more rapidly than if the walls were intact. Furthermore, after surgical intervention there would naturally be some interference with the circulation of blood and lymph."

Tissue Heating Accompanying Electrosurgery — an Experimental Investigation.

Ann. Surg. 105:270 (Feb.) 1937.

The growing prevalence of the use of high frequency currents in the resection of excess tissue has led to recent investigations concerning the possible harmful effects of the heat generated by these currents in the vicinity of their application. These investigations have been based upon temperature measurements made with thermocouples inserted into the tissue at the point where dangerous temperatures might be produced.

The conclusions reached indicate errors of from 300 to 800 per cent in the work of Caulk and Harris. There is little danger from overheating the tissue by the use of the cutting currents for any distance greater than 3 mm. Of course, damage is possible, but reasonable care should avoid any trouble. Heavy coagulation currents when applied from small surfaces will generate dangerous temperatures to a depth of several millimeters. Care to use short applications of current or moving the electrode while applying the current will eliminate the danger.

Moles, Warts and Keloids. Joseph L. Morse.

Am. J. Surg. 36:137 (April) 1937.

There is no uniform method of treatment for moles, each case requiring one that will give the most thorough removal with the best cosmetic result. The procedures in the various types that have given the best results are electrodesiccation and electrocoagulation, electrocautery, electrolysis, solid carbon dioxide, caustics such as trichloroacetic acid, and surgery, either with the electrical cutting current or scalpel. The preferable method is one that does not require

repeated treatments. X-rays and radium are mentioned only to be condemned, as they must be given in erythema doses to be of any value. Most types of warts are best treated by electrodesiccation, followed by curettage.

The treatment for keloid is irradiation or surgery combined with x-rays or radium. Any surgical procedure alone is fairly certain to result in another keloid, usually worse than the original growth.

Treatment of Obesity. H. Coombs.

Practitioner 138:95 (Jan.) 1937.

Coombs and his associates stress the importance of dietetics in the treatment of obesity. Without some control of the diet, all other methods are likely to fail. The few contraindications to treatment by means of dietetic control include extreme old age, acute disease (tonsillitis and rheumatic fever) and severe disease (grave anemia), and when fainting, nervousness, weakness or irritability occur, the treatment should be interrupted for a short period. Medical supervision should be insisted on throughout the entire course, and for some time afterward so that the patient may be kept at the optimal weight. The scientific principles consist of restriction of carbohydrates, more especially of the concentrated forms such as sugar, bread, potatoes, beer and ginger beer, restriction of fats that do not contain vitamins; very little restriction of proteins; a generous supply of vegetables and fruit to provide bulk and to satisfy hunger; an adequate supply of vitamins by vegetables, fruit, eggs, milk and butter; an adequate supply of minerals by salads and milk and restriction of table salt; no restriction of fluids; bulky meals to prevent hunger; and three or four meals during the day but nothing between meals. Another fundamental method of attacking obesity is by the inauguration of proper exercise. Patients must be encouraged to increase their activity gradually, and dancing, swimming, walking and golf are particularly to be recommended. Unlike diet and exercise, glandular therapy is not without considerable danger. Thyroid medication often causes addiction and predisposes to thyrotoxicosis and auricular fibrillation. The administration of drugs (nitrophenols) should be used with the greatest caution and only by those fully aware of its dangers. Surgical removal of adipose tissue in the abdominal region is sometimes undertaken. The adiposity generally does not recur in the same region, but this method of treatment is illogical and commands no widespread approval. Physical therapy is a useful adjunct to the treatment of many diseases and obesity is no exception, but there is considerable truth in the statement that the only person who loses weight by massage is the masseuse. Baths, diuretics and purging should be employed only under medical supervision. — Abst. J. A. M. A. 108:847 (March 6) 1937.